November/December 1998
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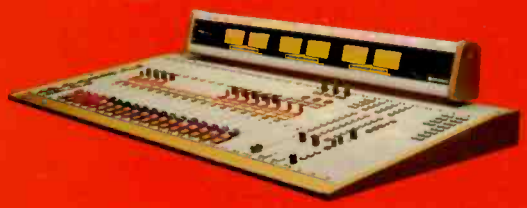
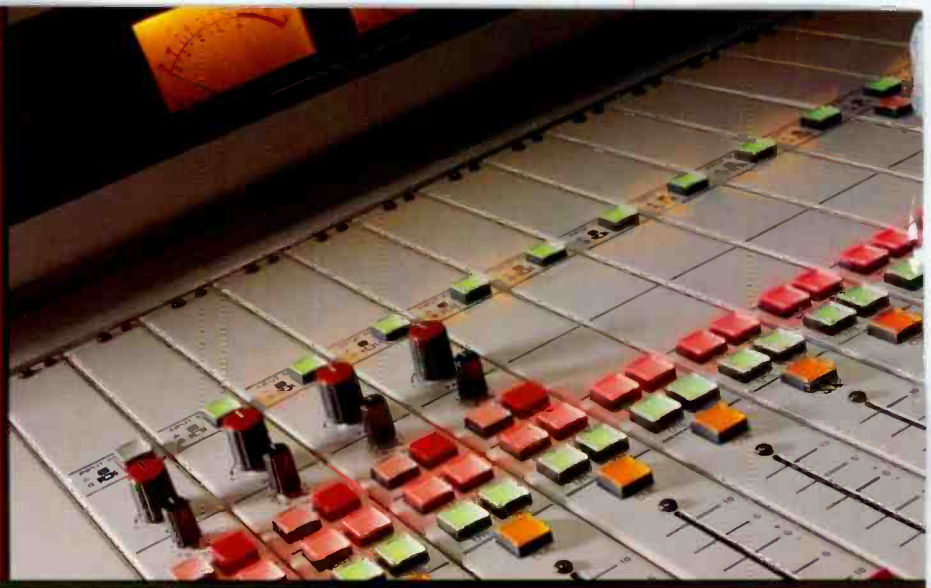
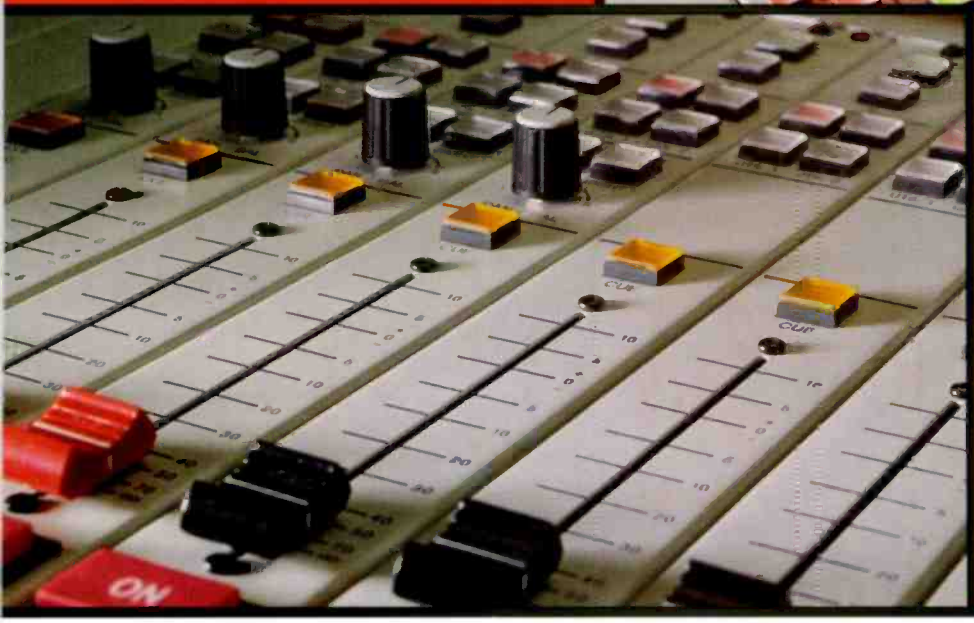
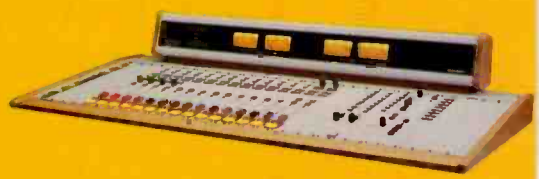


Auditronics COMET





or the digital enthusiast.



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ON THE COVER: Take a look into the crystal ball to see where we've been and what the future holds for radio. Cover design by Michael J. Knust.

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Editorial

Divide and conquer

Proponents of new technologies always forecast that an emergent system will replace something in the current environment. Like an epic tale, the old and new are pitted against one another as antagonists, with only one surviving in the end. Experience shows that such absolutes rarely occur, however. "Replacement technology" generally doesn't exist, because a clear-cut swap of one system for another isn't congruent with typical behavior.

Wisdom lies neither in fixity nor in change, but in the dialectic between the two.
— *Octavio Paz*

Consider one celebrated case, the so-called *Great Spectrum Swap*, generally attributed to Nicholas Negroponte at the MIT Media Lab. His premise held that because telephones go to *people* and television goes to *places*, telephones should be wireless and television should be wired. Unfortunately, the opposite situation existed, largely because telephones evolved from telegraphy and television evolved from radio. The Spectrum Swap was proposed as a correction more than a decade ago.

Since then, just such a switch has begun to take place, as cellular telephones and cable television emerged. Cable TV is now found in the majority of US homes, while cellular telephony is approaching 20% penetration domestically. (Internationally, Finland leads the world with over 50% cellular penetration at present.) The swap would seem to be in progress.

Importantly, however, cellular phones aren't actually *replacing* wired phones, nor has cable television *replaced* broadcast TV. Do you know any cellular phone user who has turned off his or her wired phone service, or any broadcast television station that has turned off its transmitter and just feeds cable headends directly? Certainly not.

What has happened is actually *enhancement* rather than replacement. New services are simply added to the old, providing more consumer choice. The case where a new technology truly kills off an older one is the exception rather than the rule. The CD-to-LP transition is often cited as such a case, but even this is not so clear-cut upon further review. Yes, the LP did see a very fast decline through the mid-to-late 1980s, but not really from the introduction of the CD. The cassette format was responsible for much of the LP's failure, years before the CD entered the picture. In fact, cassettes were already outselling LPs before the CD became a serious contender. While the CD has been extremely successful as a format, it continues to coexist with the cassette format, some 15 years after its introduction.

Extrapolating from these lessons, we should conclude that this kind of slow cross-fade or détente with existing systems is the more likely result of future successful introductions, rather than outright and rapid replacement. As a case in point, the cataclysmic growth of the Internet is astounding to behold, but it has not been accompanied by an equivalently volatile drop in subscriptions to print media or in ratings for broadcast outlets.

In other words, progress is inevitable, but the transitional behavior of mass audiences is slow and adaptive. New media offerings are likely to be accepted as *additional* rather than *exclusive* sources of content – at least initially. This implies that broadcast radio will not be annihilated in short order by the Internet or satellite services, but that listeners' time will be gradually split across these new offerings.

This should inform broadcasters' strategy for the future. Rather than expecting a mutually exclusive environment, broadcasters should develop new services that operate concurrently with their established operations. Acknowledge that audiences will continue to fragment, and create a suite of services that address these divergent needs from multiple directions. The key to survival will lie in the successful development and management of such diversified operations.

Skip Pizzi

Skip Pizzi, editor-in-chief

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Future tense

What will the future hold? Your guess is as good as mine. Hopefully, you've been paying attention and are aware of what is developing around you in the radio industry. Whether it's building a fully digital air chain, planning ahead for DAB, or installing a streaming audio server for the station, radio is readying itself for the next step.

Last month at the NAB Radio Show, the topic of DAB was heavily discussed. All three IBOC proponents exhibited with various pieces of technology (see *The Future for Radio* on page 32), and even the S-DARS (satellite) guys made a splash. Right now, the satellite frontier is still a lot of talk. Plans with many program provider agreements are in place, but there is not much in the way of working technology.

The biggest news in IBOC was the petition filed by USA Digital Radio for an FCC rulemaking concerning IBOC. The petition, which rivals the Starr report in its size (it was being carted around in a four-inch binder), asks the FCC to get into action on IBOC. The petition asks the FCC to authorize DAB service, specifically IBOC, because it will serve the public interest. Several steps are outlined in the petition. The first is to initiate a rulemaking proceeding for the development of DAB rules which would eventually be adopted to allow the introduction of the new service and the setting of appropriate standards. This first requires a finding to establish IBOC as the most effective means of DAB in the US. This will be followed by the creation of interference protection criteria to ensure a smooth transition from analog to hybrid analog/digital to completely digital, as well as the timeline for the transition plan. It will also call for a change in Part 73 of the rules to allow current licensees to convert signals to the new service and also specify the RF mask that will cover the frequency range.

The petition requests that the FCC specify a single IBOC system that guarantees compatibility between transmitters and receivers across the US (thus avoiding a situation like AM stereo). That selection begins a timetable to establish submission of alternate IBOC system proposals and the testing criteria to evaluate them. This will culminate in a final selection process for the single system that will finally be implemented.

One of the key factors in the process will be the transition period. Careful handling of the hybrid phase will allow a truly smooth transition period. In television's digital transition, there are stations that will have to make two frequency changes as spectrum is shifted around. In most, if not all, cases this will be a tremendous financial burden on the stations involved. A well-developed IBOC transition phase eliminates the need to jump around on the dial.

All three proponents are working on systems that share certain basic similarities. The petition obviously favors the USADR approach, and why not? They're the ones who wrote it. The important thing here is that this may be the spark that terrestrial DAB has needed. There are some who may not agree with everything in the petition, but that's the beauty of our system. As the petition continues its course, there will be opportunities for others to comment as well. We can only hope that the process does not get bogged down by minutia. I'm certain that there will be plenty of reply comments when the window is opened, not only from the other IBOC proponents, but from the NAB and some of the station groups.

While the NRSC is considering what to do next on IBOC, this petition will serve to get the FCC moving on the issue. It stresses the importance of creating the procedures to evaluate and select a system that will be implemented. It also calls for a coordinating effort to begin in earnest the transition to a digital future.

As we look to the future of radio, IBOC DAB may be taking it first real steps.

Chriss Scherer

Chriss Scherer, editor

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The future of contract engineering

By John Caracciolo

If video killed the radio star, then consolidation killed the contract engineer — or at least wounded him and changed his job description.

A few years ago, before the passage of the Telecom Act, most radio stations in the top markets had at least one full-time staff engineer. The job description was well defined and consisted of one station, or maybe two if the ownership had an AM/FM combo.

In the face of so much consolidation, contract engineers may have trouble maintaining accounts, but should be able to find plenty of work with facility construction projects.

Fast forward to 1998, where consolidation in the radio industry is finally setting in. Major market groups have divided and conquered and the focus is now on running the properties and increasing cash flow. Stockholders are looking for increased profits; group owners and management are looking for ways to streamline radio market groups.

Tracing the line

What happened to the engineer who had one or two facilities to run? That engineer became a contract engineer without even realizing it. The one-engineer-to-one-station days of are fading fast. Now the station engineer wakes up to find that his owner has acquired the other three FM's in town and his new responsibilities include oversight of those properties as well. Repeat this scenario three or four times in one market and you have four engineers with the responsibility of five or six facilities each.

Maybe one of the smaller signals you just acquired has a contract engineer? Most of the time the contract engineer is out and the responsibility now falls on you, the new chief engineer of the group.

Before the Telecom Act, the contract engineer for the smaller station was often times the chief of a larger station in the market. When consolidation of the smaller stations started, the new, larger groups took over the engineering responsibilities. Even if the new owner considered keeping the contract engineer, that owner was frequently involved in streamlining a merger project at his own station and with those added responsibilities had little time for a side station.

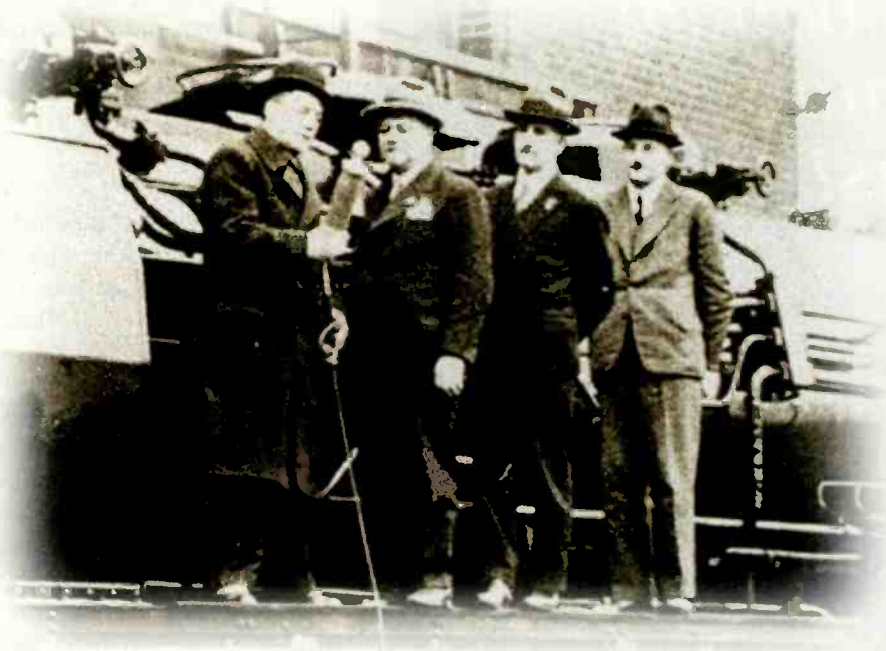
In the late 1980s, I was fortunate to have enough spare time on my hands to run a successful contract engineering business that had about seven clients. Most were college and high-school FM stations that needed RF maintenance work or on-call emergency service. As stations started bulking up and industry multiples started to rise, my full-time employer began adding stations. With the addition of stations, I found my spare time was used to run the group and develop the plans and strategy for our own consolidation and growth. It became necessary to give up most of my clients and concentrate on building our group and my growth with the company. Many of the smaller stations I gave up had difficulty finding a replacement engineer.

Out to "C"

Consolidation brought many positives to the industry as a whole. However, one major negative was that it fostered a drain on engineering talent in the radio industry. When consolidation hit, some competent quality engineers were brought into the larger groups and offered jobs with great pay and benefits. The engineers who were left out moved into other industries – computer, the Internet, PCS, or cellular – and our radio engineering talent pool was significantly depleted.

The industry is suffering from a scant supply of quality full-time engineering help. Look at the help-wanted section of this issue or any trade publication. There are always numerous positions available for qualified engineers. If we can not even find quality full-time engineers for positions with major groups, how are you ever going to find a qualified, part-time contract engineer to maintain your RF plant? The real victims of this industry-wide shortage are the smaller stations and the educational facilities.

The term "contract engineer" is outdated and headed for extinction. We need to reevaluate this position, and



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Contract Engineering

attract and train newcomers to the field, thereby filling the voids in the smaller facilities and educational stations and enabling them to again serve as the training ground for our industry.

The search

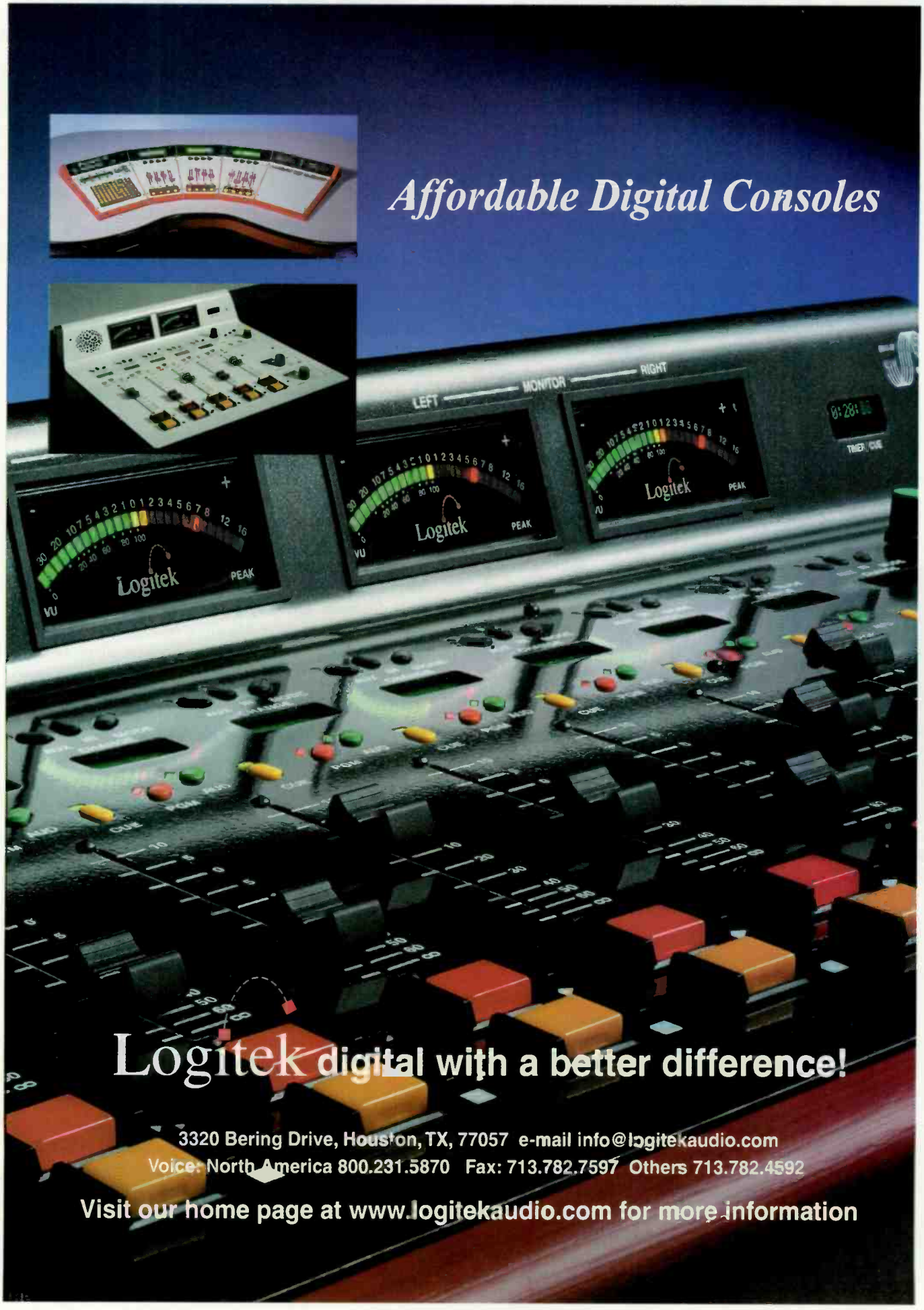
Where will we find qualified engineers? We'll probably find them through an association with a major manufacturer or vendor. When contract engineers were forced out by consolidation, they themselves consolidated. They formed alliances with major vendors, and were contracted out to stations by the equipment companies. This works very well for the station looking to upgrade or purchase new equipment. They receive excellent sales help and get a qualified engineer to install the product. However, what happens eight months later when they have a major failure at 3AM? That is where we have to step in. We need to reenergize the engineering industry. We need to get young minds and fresh faces into the field and make them want to stay in it.

The contract engineer of the new millennium must be an excellent communicator. He must be able to think independently and work unsupervised. He needs to possess a business savvy that will help bridge the gap between management and engineering. These skills, along with proper technical and computer training, will help the radio engineering field prosper and grow well into the next century.

BY DEFINITION....

con·tract en·gi·neer: *n.* A part-time, on-call technician responsible for the overall technical operation and maintenance of the studio facility and RF plant.

the con·tract en·gi·neer of the new mil·len·ni·um: *n. adj.* A consultant and technician capable of overseeing the technical operation and development of the studio and RF plant into the new millennium. Must be computer literate and have full knowledge of digital studio and transmission implementation. Must be able to recommend upgrades to audio and computer facility and help design multi-user consolidated studios.

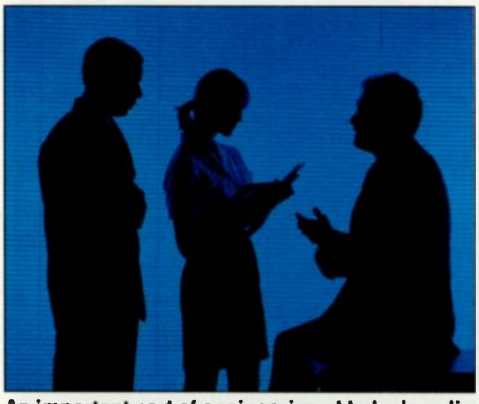


The ultimate asset

By Skip Pizzi, editor-in-chief

It's nice to know that one thing hasn't changed: A radio facility's most valuable assets are still its human resources. Technology may be changing the face of the radio station, but its soul remains human, powered by people on its staff communicating with other people in its listening audience.

The radio station's product is itself an intangible thing. Radio is an ephemeral, impalpable product, as Billy Crystal pointed out in his role as a radio ad salesman in *City Slickers*, when he lamented, "I just sell air!" Why, with all the other audio choices available, do listeners keep coming back to their favorite radio stations? Why do they develop such strong brand loyalty? Why do radio advertisers keep finding successful response? The answer has nothing to do with the equipment or systems in place at the facility (although they play an important supporting role), but it rests squarely on the shoulders of the people who work there. It is their contributions that attract listeners and distinguish one station from another. The rest of the facility merely provides a context for the creativity of a radio station's staff.



An important part of engineering at today's radio stations is the imparting of knowledge to non-technical staff.

Radio also remains a collaborative craft. A well-balanced and cooperative team of disparate players is critical to its success. It takes both left- and right-brained types, ranging from the extremely technical to the flamboyantly creative, and all of them must work well together. Building and maintaining such a group is a true management challenge.

Evolving technical needs

Because this publication deals with technology, we'll focus on the issues of technical staffing at the radio facility. In today's environment, this gives us plenty to talk about.

Perhaps the best news is that radio's increasing computer focus has allowed it to draw some of the best and brightest again. This may put a stop to the brain drain that has occurred in the industry over the last decade or so, as many good engineers moved elsewhere and new candidates saw little opportunity or attraction to the field. Today, sharp computer engineers with a flair for audio or multimedia are being attracted to radio broadcasting by the glitz of its entertainment-business connections. This challenging work and exciting environment is keeping many of them around, although there's still a great and growing need for more of this kind of technologist throughout the industry. Because nearly *every* business needs good computer support today, radio needs to exploit its high profile to attract these folks. Competitive salaries and benefits are required to hold onto them.

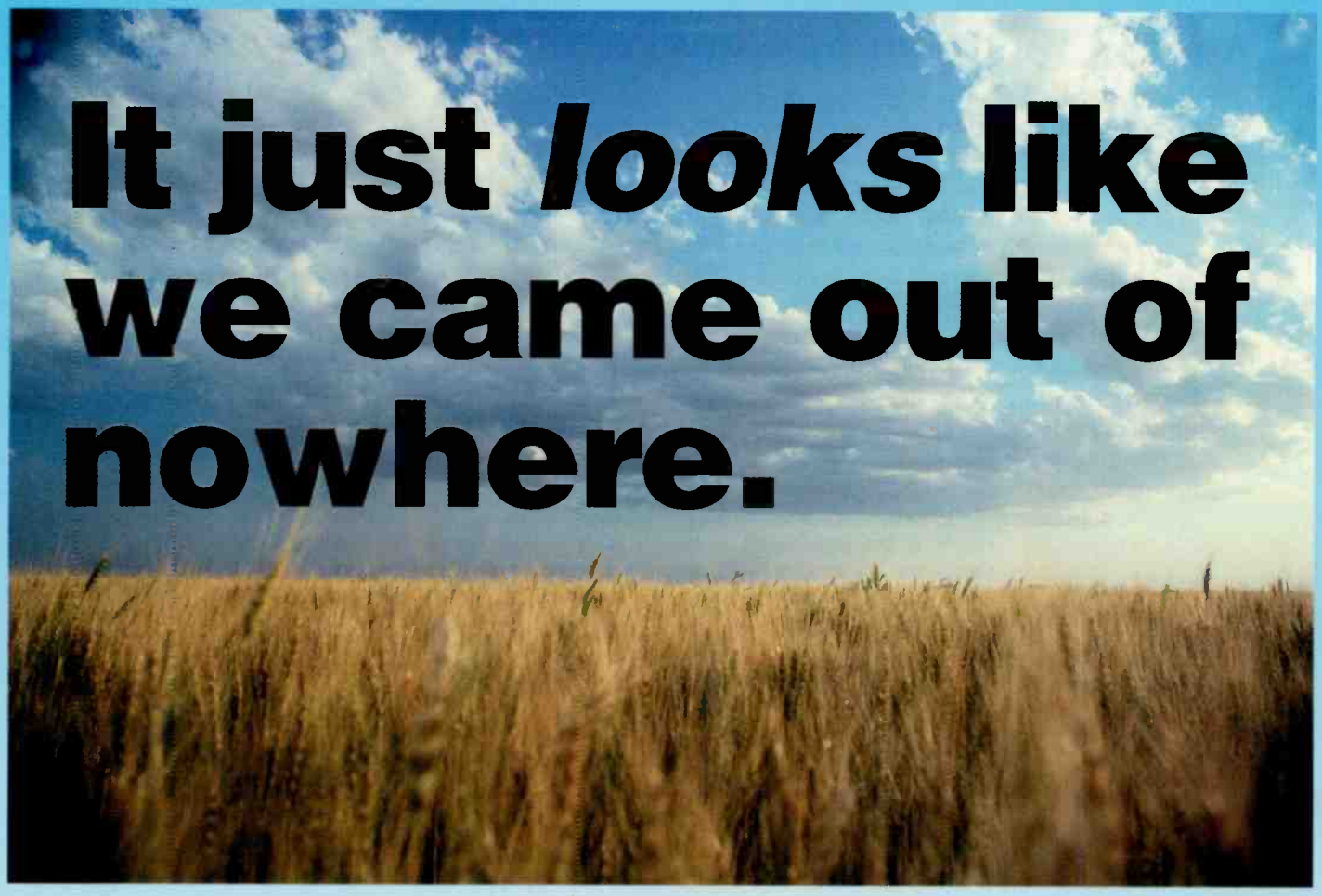
Consolidation can be helpful here. Working for a large corporation is generally attractive to these candidates. It allows local radio stations to compete with other high-tech, financial and corporate firms that will also be on these candidates' radar. Clearly, a radio operation is more fun than a bank, but the bottom lines of salary, benefits and career advancement have to be comparable if radio wants to attract these top performers.

Don't forget transmission

As important as computers are, traditional RF engineering is still important in radio, and will remain so. Finding a single engineer who has the schooling, let alone the experience, in both computer and RF engineering is a rarity. These have become two separate disciplines, requiring two different staffing solutions.

Remember also that the real RF training of today's radio engineers is more likely to come from on-the-job experience than from school. But since deregulation, the elimination of staff chief engineer positions has also reduced the number of assistant-chief apprenticeships for younger engineers. Now it's up to contractors to bring up their own protégés, which some contract engineering firms are wisely doing.

This environment makes it appropriate for most managers to proceed with the following general strategy: Hire computer and operations support as staff, and cover RF engineering with contractors. This doesn't mean that the operations director or someone else who's good with computers should become the staff "alpha geek." It means instead that a seriously credentialed MIS person should be hired, and that this person should be trained in (or if you're lucky, come with some understanding of) the needs of a computer-based audio operation. The recent emphasis on streaming media over the Internet



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and multimedia in computers has made this less of a stretch than it used to be. Many computer engineering students and young professionals have developed significant experience in audio and video media along the way.

For this to work properly, radio management is faced with a twofold challenge in technical staff integration: 1) Get the operations and computer support staffs working well together; and 2) have both of those groups interface properly with contract engineering support, which may still be servicing some of the traditional audio infrastructure of the studio plant (e.g., routing switchers, CD and DAT machines, telephone interfaces, etc.) in addition to its RF maintenance duties.

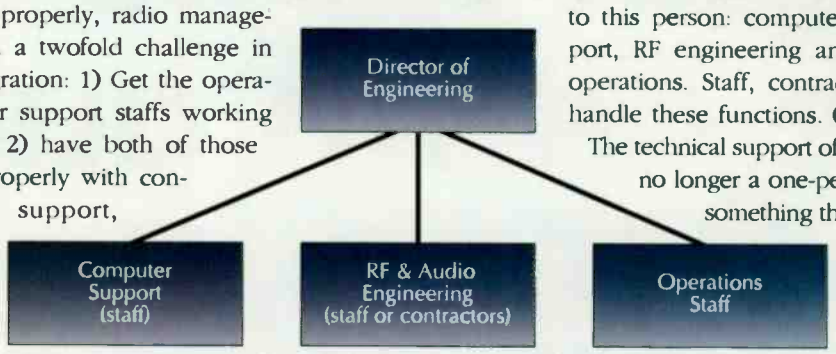

Figure 1. The components of today's radio engineering involve three separate disciplines. Shown here is a proposed engineering department structure.

The new order

For the last several years, a number of leading-edge radio operations have been working out this new technical support model. What has developed for the multi-station facility in larger markets is an engineering department structure that places an experienced radio engineer in its lead technical position — call it director of engineering, engineering VP or chief technology officer. This position oversees all technical operations for each of the stations in the group.

Typically, up to three separate departments will report to this person: computer engineering/support, RF engineering and, in some cases, operations. Staff, contractors or both may handle these functions. (See Figure 1.)

The technical support of a radio operation is no longer a one-person shop. Nor is it something that can be completely outsourced. With sufficient consolidation, a sensible hybrid of staff and contract engineering — managed by a senior staff member — will provide the best overall solution.

Once this team is in place, good engineering management will encourage its staff to learn from each other about their respective sub-disciplines. Good overall station management will encourage *all* of its departments to do the same. Without such mutual understanding, the power of collaborative teamwork that a radio broadcast operation requires will never reach full potential. The best-equipped radio broadcast facility on the planet is worth nothing unless it has the right staff.

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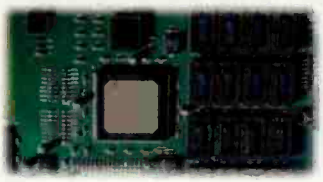

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Antenna tuning and networks

By John Battison, P.E., technical editor, RF

An important element to an AM transmission system usually sits in a cabinet and is seldom thought of. Far too often the antenna is erected and sufficient tuning is performed to pass the FCC's requirements, and then this vital last link is forgotten until something bad happens. While FM antenna adjustments must usually be made up on the tower, AM adjustments can be made on the ground.

Tuning and adjusting

Unlike FM, every AM antenna has a different operating impedance. You can't just hook a piece of coax to an AM antenna and connect the other end to the transmitter output — it is almost always necessary to match the antenna to the transmission line, and hence the transmitter. This requires an *antenna-tuning unit* (ATU). The ATU provides a means of canceling out the antenna reactance, transforming the antenna resistance to the desired load for the transmitter, and reading the RF current into the antenna.

Many antenna tuning units are left neglected, unlike this one.

For simplicity, we will consider only nondirectional systems, but the same ideas apply to phasors. A single AM antenna may have an impedance ranging from a very low resistance of 20Ω to as high as 80Ω or more. It all depends on the height, diameter of the tower, the frequency, and whether there is any top loading.

The *characteristic impedance* of a tower may be calculated from the expression:

$$Z_{ant} = 60\left(\ln\frac{2G}{a} - 1\right)$$

Where:

Z_{ant} = antenna impedance in ohms

G = radiator height in degrees

a = equivalent radius of radiator in degrees

Similar towers using the same design will differ slightly because of minor variations in size and construction. In any case, it is far simpler to open one of the many engineering handbooks and read the approximate impedance from a set of tables.

The 90° radiator is very popular for AM use. It is a sort of standard size and being a quarter wavelength makes for easier calculations and design. It's base operating impedance can be approximated quite accurately from the existing tables. A good starting point is a theoretical operating resistance of around 37Ω and a reactance from around -j50 to around +j100. This varies based on the characteristic impedance and whatever may be hanging on the tower altering its ultimate base impedance.

An operating impedance of this sort can be quite easily matched to a 50Ω transmission line with a simple L network like that in Figure 1.

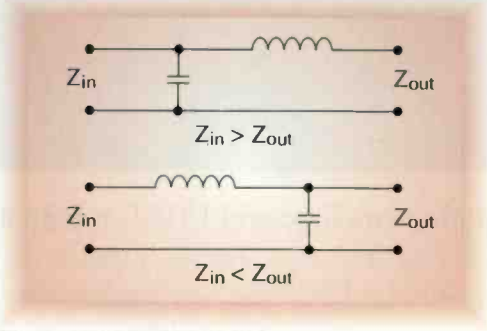

Figure 1. A basic L network.

L networks are not used as much as T networks, mainly because they will not match impedances with equal resistance and differing reactances, and the T has built a reputation for easy adjustment. The major reason for the general lack of L network use in DAs is that phase change is intimately related to resistance and phasor adjustment would be very difficult.

Feeds for shunt-driven antennas and the folded-dipole antenna sometimes use an L network. If the feed point has been selected carefully, only a small amount of ±j will be needed to cancel out the reactance and still offer an acceptable resistance to the transmitter. This is not a good idea unless the reactance is variable to allow for adjustment as the antenna's characteristics change over time, as they usually do. If you have used the antenna reactance as the *only* reactance, you will have problems in matching.

T networks

The T network is a useful device. It provides an easy method of matching an antenna to a transmitter and is easily calculated. When a -90° phase shift is acceptable, the leg impedances can be calculated from:

$$X_1 = X_2 = -X_3 = \sqrt{R_1 + R_2}$$

The T network is certainly used a lot in directional antenna systems, but this popularity may be due to the

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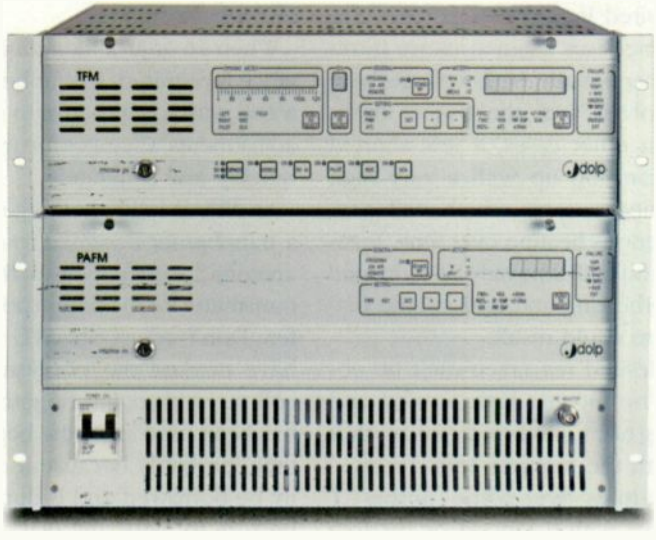

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fact that not only is it easy to calculate a 90° phase shift, but it gives good control. However, some engineers have found that a T network at about -60° phase shift gives a flatter bandwidth at resonance than the favorite -90° T. The fact is that the sideband impedances at a lower phase shift don't change as drastically with the ±10kHz shift with modulation across the carrier frequency. Phase shift is also less. This might be of help in some situations where null-area distortion is very bad. These are admittedly small changes, but as part of a whole they can contribute to overall distortion.

Words of caution

I have come across a considerable number of ATUs with one or more turns shorted out, presumably done as an apparent method of obtaining the desired impedance match.

In some cases when turns are shorted, exceptionally high voltages can be involved with the risk of flashover. In other cases, a few shorted turns can end up with a very high circulating current which will produce serious heating over time. Insulators and coil clips may be damaged by overheating and, in extreme cases, a fire could result.

If a desired reactance can't be obtained by moving taps around and shorting turns, it is best to get another coil with the required inductance.

Sometimes we come across T networks with a tapped or variable inductance and capacitance in series in one of the legs. This is usually a technique used to provide a variable negative reactance. For instance, a shunt leg reactance of -j73 may be needed. This may be impossible to find, and in any case it is good sometimes to have a variable quantity. So we buy a capacitor with a reactance of -j100. Then we place an inductance with about +j30 of reactance in series with it. This gives us -j100 plus +j30 and leaves -j70. By adjusting the coil and eliminating a few turns we reach a value of -j100 plus +j27 leaving us with the desired -j73 in the shunt leg.

What's wrong with this? Theoretically nothing. Actually, maybe everything. Purists frown on this method of obtaining desired reactances. The best bandwidth is found when there is no inductance placed in network legs designed to be -j (negatively reactive) because the presence of the inductor reduces bandwidth. A variable vacuum capacitor is preferred, but they are much more expensive. If money is no object, go with the variable vacuum capacitor. Similarly, if adequate phase shifts can be found elsewhere and things are equal, go with T networks operating at around -60° phase shift.

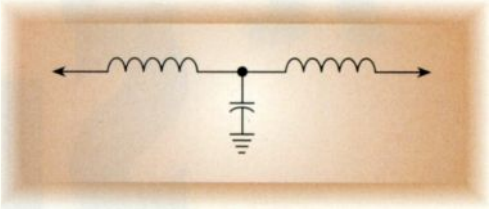

Figure 2. A T network is commonly used in most applications.

When an adjustable inductive reactance is required, it is far better to use a coil with a wiper arm to make fine adjustments. Changes are made more quickly and accurately.

An ATU is really nothing more than a transformer designed to match the antenna's impedance to that of the transmitter for maximum power transfer. Don't adjust an ATU until you have marked the position of every coil tap with paint; fingernail polish has been used since the beginning of time, probably because it could easily be borrowed and is durable. Also be sure to mark any dial settings.

The shunt leg is the one that controls the input resistance; if you're close to desired R input but Z is impossible to tune out with the input range available, reset the output leg and try again. Sometimes it takes a lot of very small changes to achieve 50Ω±j0. That's where continuously variable coils and vacuum variables are worth their weight in gold.

There are many computer programs available that will calculate the currents and voltages in an ATU. Always check the operating conditions when making ATU changes and ensure that no components are overloaded.

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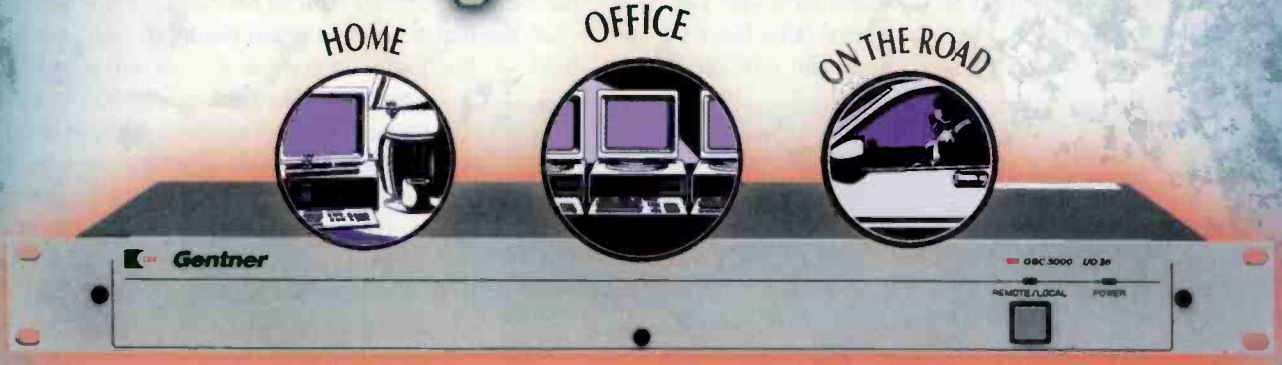

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Circle (26) on Free Info Card

The audio legacy

By Chriss Scherer, editor

So much technology is being introduced that allows us to transmit and route audio signals over a variety of signal paths. The highest quality audio signal is always the goal because radio is audio and can't rely on the other senses to fill in the gaps like, say, television. However, sometimes just getting on the air is the important thing.

POTS is parts

The simplest method for transmitting audio signals is the POTS line. They are everywhere. Whether it's a pay phone, cell/PCS phone or a single-line port off a PBX, finding a dial tone is pretty easy. When getting on the air is the first priority, the self-contained telephone set can save the day.

POTS lines are a convenient way to send and receive audio. There are many possibilities and a wide variety of coupler types. (Photo courtesy of Gentner.)

Most stations have equipment in place to put a telephone caller on the air. Even in music format stations, there is probably a telephone hybrid. Some hybrids are analog, some are digital. Either way, the function is the same: split a duplex two-wire signal into a simplex four-wire (send-and-receive) signal.

Digital hybrids have gone beyond the basic splitting operation. They've added smart circuitry to monitor the telephone line and make the necessary adjustments in equalization and level for any phone call, whether it comes from across the street or across the globe. I'm sure you've heard the short burst when a digital hybrid is first connected. This audio burst is used to analyze the line and make the necessary adjustments.

If the only hybrid available at your station is in the on-air control room, consider making it available in the production room if installing a second unit is not possible. Being able to use it off air can help in many situations.

On the remote end — when calling in from out in the field — the audio system is not as advanced. Most telephones have either a carbon or electret element in them and were designed for the limited bandwidth of which the telephone system is capable, and therefore provide a similar limited-frequency response and poor dynamic range. The mic element may also be designed to have noise canceling characteristics to help with intelligibility from the caller. While these may help in a routine call home from a noisy restaurant, they are lousy at providing acceptable quality for broadcast.

If a straight telephone is all that is available, try to get a higher-quality microphone in the signal path. Simple telephone couplers, like the legendary QKT can tap into a phone line easily. Adding a mic and a line amplifier can be done in a small package.

Still POTS, more parts

There are other ways to get into the phone as well, including devices that can tie into a phone line without having to go directly to the phone line tip and ring. Any phone, even a digital set, has a basic hybrid built into it. This is how the handset works. By installing a unit between the handset and base, a simple connection can be made. You are still dealing with the limitations of the telephone set's hybrid, but again, you're working with basic telephone quality to begin with.

With so much business being conducted from hotel rooms, portable computer technology has been introduced including adapters that can be hooked up to any telephone jack to give an emulated POTS jack. These small and inexpensive devices will analyze the line they are connected to, whether it is analog, PBX, digital or

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whatever, and then provide tip-and-ring output on an RJ-11 jack. These were designed for modem usage to protect the modems from strange voltages encountered by the business traveler. The switching equipment involved is a limiting factor for quality, but even after the conversion, data rates are typically around 26kb/s.

All of these ideas are still limited by the audio response of the telephone carrier, which is limited to a range of 300Hz to 3kHz.

The next step

The capability of the standard POTS line has been extended many times. Frequency extenders, introduced over 10 years ago, lead the way in improving audio over the phone. Single-line systems lead to two-line systems and then three-line systems. Arranging for three telephone lines at a remote site takes advance planning, so showing up at the last minute and asking for three lines is not very practical. You can still find frequency extenders in use, but a newer technology has surfaced that is changing the role of the POTS line.

POTS codecs have made last-minute remotes even easier since they provide good audio quality over a standard line. Add to this that most of them are built into self-contained packages, and a complete setup can be done in a matter of minutes.

POTS codecs have made last-minute remotes even easier and most of them are built into self-contained packages; a complete setup can be done in minutes.

Another added advantage to POTS codecs is a built-in return feed. Frequency extenders are one-way devices, so a separate return path for cue or IFB must be established. The self-contained POTS codec packages also have monitor mixers so a balance between local and return audio can be easily established.

POTS codecs are typically capable of delivering signals up to 7kHz with connect rates around 24kb/s. Higher bandwidths are possible with higher connect rates. Some recent introductions exceed this.

Because of the need for a robust signal path, POTS codecs do not work well with cellular and PCS phones. There is error correction, but unlike downloading a file, if enough bits are lost, you can't go back and retransmit the signal and stay in real time. Likewise, connections through a PBX or other switching network may limit the transfer rate and reduce the quality of the feed.

POTS lines will be around for some time to come, even with ISDN and xDSL technologies showing up everywhere. A single phone line may not be able to deliver a full-range signal, but the trade-offs of lower cost and common availability make this legacy system a true solution provider for daily operations.

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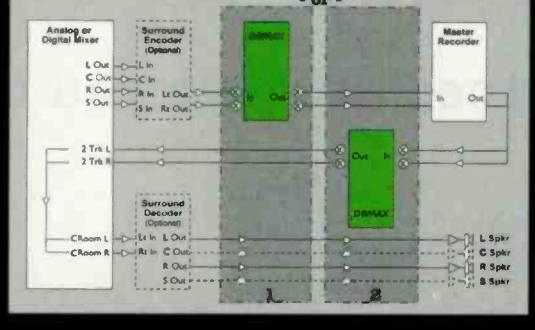

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FCC streamlines application processes

By Harry Martin

In October, the FCC adopted new procedures to simplify radio and TV applications and, starting in the fall of 1999, the agency will require them to be filed electronically. The FCC additionally revised the requirements for selling and extending unbuilt construction permits and decreased the frequency of ownership reports to every two years.

- **New Forms:** The FCC simplified 15 key broadcast application and reporting forms to make them compatible with electronic filing. In many cases certifications have been substituted for the narrative exhibits currently required. The FCC will conduct random audits of up to 5% of pre-grant and 5% of post-grant applications, with serious penalties for false certification.
- **Electronic Filing:** Electronic filing will not be available before March 1999, but will become mandatory on a form-by-form basis six months after a form is eligible for electronic filing. The FCC will make available computer software that permits forms to be filled out directly on a computer screen, with the completed form transmitted instantly to the FCC via the Internet. Electronic forms will include fee submission information. Security will be ensured through the use of passwords selected by the applicant or licensee and unique account numbers assigned by the FCC. Applications will be available to the public via the Internet shortly after they are filed.
- **Construction Permits:** All initial broadcast construction permits will now be issued for three years, in lieu of the current two years for full-power TV stations and 18 months for other broadcast facilities. In addition, the FCC eliminated the current restrictions on for-profit sales of unbuilt stations, allowing permits to be sold for any price the parties negotiate.
- **Ownership Reports:** Ownership reports for commercial stations will now be filed every two years instead of annually. In addition, the revised ownership report form will require identification of the race/ethnicity and gender of each individual or entity having an attributable interest in the licensee or permittee.

FCC looking at new EEO rules

FCC Chairman Bill Kennard has said he would like to have new or revised EEO rules proposed by the end of the year and in effect by mid-year 1999. Alternative approaches to a rulemaking notice on EEO are being developed by the FCC's staff. One, which would attempt to accommodate divergent views among the Commissioners, would take the form of a general fact-finding document which invites comment on a wide-ranging set of suggested policies and legal issues, including the FCC's basic authority to promulgate EEO rules. No specific regulations would be included in the proposals.

A second approach would have the FCC propose specific rules similar to those invalidated in the Lutheran Church case, except without the numerical EEO processing guidelines targeted by the court. Through this scheme, FCC Rule 73.2080(a), banning employment discrimination because of race, color, religion, national origin or sex, would be retained, and the "outreach" requirements of Rules 73.2080(b) & (c), such as the following, would be reimposed:

- Utilize media, minority and women's organizations, educational institutions and other sources of minority and female applicants to supply referrals whenever job vacancies are available.
- Communicate the station's EEO program and employment needs to sources of qualified minority and female applicants.
- Conduct a continuing review of job structure and employment practices.
- Post notices informing employees and job applicants of their EEO rights.
- Undertake to offer promotions of qualified minorities and women in a nondiscriminatory fashion to positions of greater responsibility.
- Analyze efforts to recruit, hire and promote minorities and women and address any difficulties encountered in implementing the EEO program.

To enforce these requirements, some FCC staff members believe the agency might continue to monitor job "applicant pools" to make sure they include minorities and women. The use of applicant pool analysis, which focuses on efforts rather than hiring quotas, first was emphasized by the FCC after the Supreme Court's 1995 decision in Adarand Constructors, Inc. v. Pena, which struck down government-imposed racial classifications in hiring.

Harry Martin is an attorney with Fletcher, Heald & Hildreth, PLC., Arlington, VA. E-mail: martin@fhh-telcomlaw.com.

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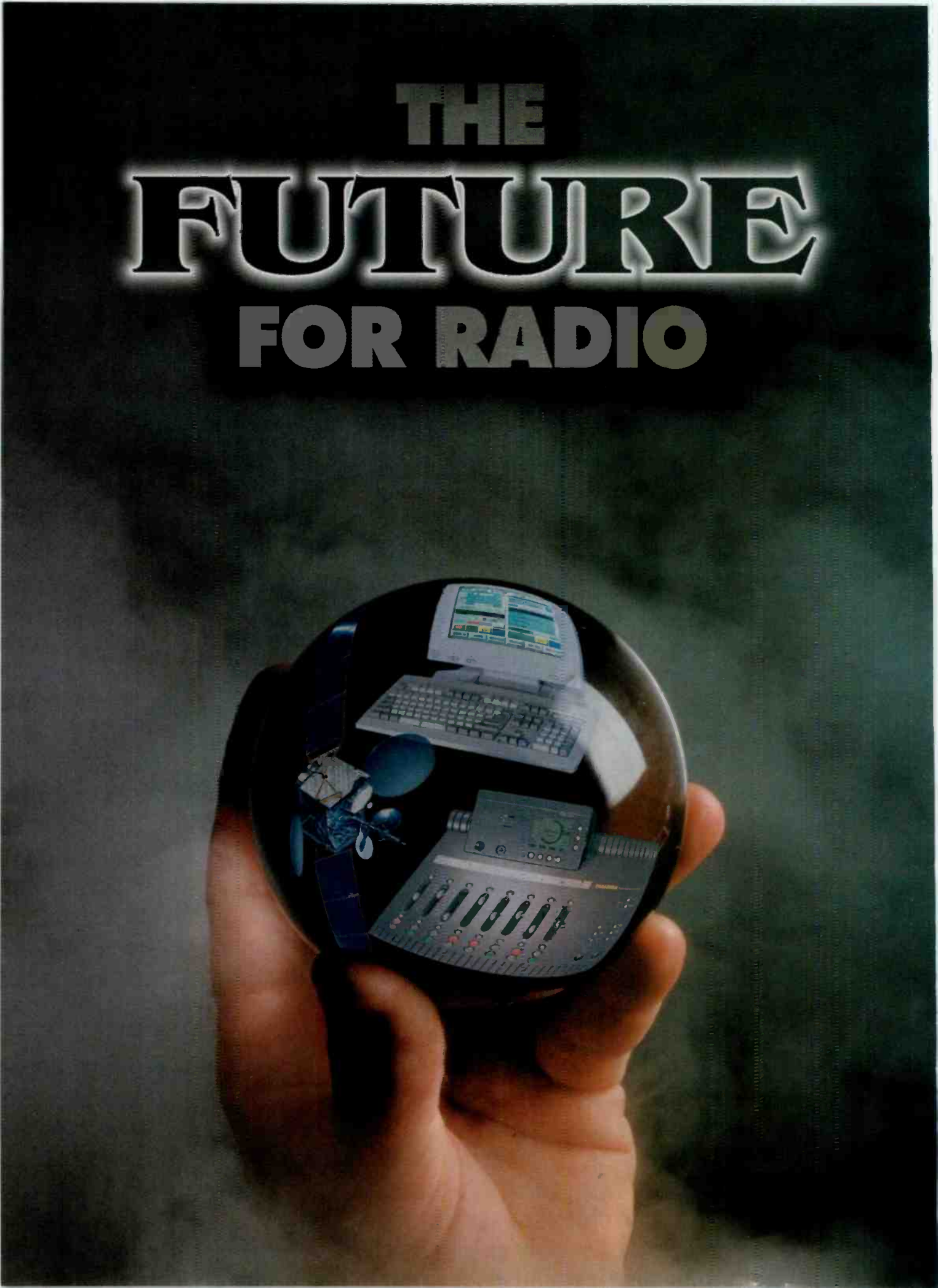

COMPUTERS, DAB AND THE INTERNET

WHERE ARE WE GOING?

By Chriss Scherer, editor

The change in century brings with it varied concerns, especially in the computer industry. The next millennium may also mark the next age of radio.

We have already seen some significant changes from the beginnings of radio. Its evolution from a novelty to spectacle to a big money business took decades to happen and it's certainly not over yet. Some of the more recent changes included CD delivery, computer storage and automation, and ISDN and other forms of high-speed transmission. Other technologies have emerged and are or will be affecting how we do business.

DAB

The subject of digital radio has been covered many times and in many ways. European countries are moving ahead on DAB with some facilities already on the air in some capacity. The Eureka-147 system has gained popular acceptance abroad, with receivers now available in Germany and the UK. Canada is not too far behind Europe. As you probably already know, the L-band spectrum used for Eureka is not available in the US. The military has it occupied. This has left the US in the unaccustomed position of being a technology follower.

Despite this lag, the digital frontier is working on two planes in the US. The terrestrial systems being worked on are all IBOC (in-band, on-channel). There are currently three proponents working on a solution, two of which are relative newcomers to the arena — Digital Radio Express (DRE) and Lucent Digital Radio. USA Digital Radio (USADR) has been working on a system for several years and first demonstrated a prototype at the 1995 NAB convention.

Test prototype IBOC exciters (top) and receivers that were shown by USADR at the NAB Radio Show.

DAB was a hot topic at the NAB Radio show in Seattle last month. There was plenty of buzz around the show floor about who was there and what they were doing. All three IBOC proponents exhibited. For DRE and Lucent, this was a necessary step for them to show a commitment to offering an IBOC solution.

USADR recently filed a petition for rulemaking with the FCC asking for the establishment of an IBOC standard and service. With predicted service launches of late 1999 to early 2000, this is a necessary step.

The three proponents all displayed various aspects of their systems. USADR showed the prototype exciter and receiver it will use for its next set of multiple market tests. Lucent had full demonstrations of PAC (*Perceptual Audio Coder*), the algorithm that is used in its system and other limited-bandwidth applications. DRE had a van equipped with test and measurement gear for its tests.

The other area of development is in S-DARS (Satellite Digital Audio Radio Service). Capitalizing on radio's unique position as a mobile medium, the two S-DARS licensees in the US, CD Radio and XM Satellite Radio (the former American Mobile Radio Corporation), are preparing to launch (literally) satellite-delivered

services. Both have agreements in place with various content providers for a wide range of audio services. They each plan to offer up to 100 channels of digital audio, with some channels being free of charge and containing commercials and others offered on a pay-subscription, commercial-free basis.

Both US DAB technologies are shooting for implementation in 2000. The IBOC systems have a way to go to meet this challenge. If both services become available at the same time, the biggest advantage for both of them would be to offer radios capable of three modes of service — analog broadcast, IBOC and S-DARS. Allowing consumers access to all three services with a single piece of hardware instead of discrete components or add-ons will help drive the success of both new technologies. There are not yet any agreements in place for a radio manufacturer to offer a single receiver capable of both DAB services.

The Internet, WANs, intranets and extranets will all play significant roles in radio's future.

Integration and consolidation

Stations that were once fierce competitors have, in increasing numbers, become co-owned and might even share facilities. This is the case in many markets. The effects of consolidation have been felt nearly everywhere, and it's a safe bet that the consolidation will continue into the next century. The effects have even gone beyond stations to the manufacturers. Announcements made at last spring's NAB convention included established manufacturers buying others and group owners buying major interests in manufacturers.

Equipment has become more integrated as well. How long ago was the first computer installed at your station? How long until the second, the third, the network, e-mail and Internet access? It's amazing how much we rely on them for the basics of operation. Reliance on computers will only increase. (Technical job security today relies not only on audio and RF, but also on some level of expertise in computers.)

LANs, WANs, intranets and extranets are already widely used and will continue to grow and evolve. The computer industry gets a face lift every few months. Broadcasters benefit from this by not having to invent the technology, like they did in the early days of radio. It already is not uncommon to have several people work on a single production without being in the same building. The voice talent in Dallas sends his track to the musician/composer in Los Angeles, who in turn sends his work to the editor in Chicago for final mixdown before having it played in Baltimore.

On-air and online

Is your station online? Having a Web presence is almost expected today. If nothing else, it serves to keep you on the public's Internet radar screen. Adding services and features will be a neccesity, whether it's as simple as taking e-mail requests and selling station merchandise, or as intensive as fully loaded multimedia netcasting. The Internet/radio partnership will grow.

Back to the show

The NAB Radio show floor and sessions cast an eye toward current and potential increases in radio's competition with the Internet and other new media services. New recording/playback formats and DTV have the potential to subtract listenership because, essentially, someone watching TV or listening to a CD or DAT is not listening to the radio.

Arbitron released data from a study that looked into Internet usage among radio listeners. The data obviously shows an increase in Web activity. It also shows that radio is seeing a level of competition from this medium. There is some online listening, but it's not yet to the point where people are listening exclusively over their computers and not over air. However, in some environments, like offices, where over-the-air reception may not be possible, an Internet LAN connection may provide a means to reach this valuable audience segment.

What's in a name?

What defines *radio*? Is providing a continuous audio program with a popular (in some fashion) appeal all that is needed? Do you need a transmitter? Do you need a feel for the local audience? Does it have to be portable? Some believe that the Internet is the next medium for radio. We already see some of that today. How many "stations" are online? Not FCC-licensed stations with a transmitter *and* an online audio stream, but *only* an online audio stream?

Online stations do provide a continuous program feed with a type of transmitter (audio codec and a server). Perhaps this is the next step for DAB? As compression algorithms become more advanced and portable

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Internet access becomes as common as Walkman radios, tuning in your favorite station may not involve selecting 100.7MHz or 1420kHz, but *www.mystation.com* instead.

Another possibility is portable storage players that can store audio from the Internet for playback at a later date (See *Last Byte*, p. 80).

Technology and competition

Television is about to undergo a change we hope will show radio how to evolve from an analog to a digital delivery system. Any of its obstacles and challenges are likely ours also, and its victories will help shed some light on the path to a DAB future.

The added choices provided by multichannel DTV, online entertainment and new technologies like DVD will be stiff competition for the common audience. Will radio be able to stay up to date and compete? Radio must find ways to stay fresh and interesting to the public.

Perhaps these new media choices will drive radio to once again become more diverse in its programming while still keeping a watchful eye on the bottom line.

Digital, of course

Naturally, digital technology will play a key role in nearly everything to come. The practice of wiring a facility with discrete runs of wire is going away. Most digital consoles include the capability to route signals as well. The interconnection between all the audio sources in a facility may be a multiconductor assembly, or even multiplexed on a coax or fiber connection if there is a distance involved. In many installations, the audio storage/playback system and the console controller will be a few feet apart. The cabling needs will change from multiple pairs for analog or AES3 audio to high-speed data and extensions for computer keyboards, monitors and mice.

Delivery, editing, storage, routing, processing, transmission and reception will make up the signal chain in tomorrow's all-digital environment, just as they did in the analog world. Many facilities have begun the transition to digital and have some of these elements in place. The analog pieces that remain will soon begin the process of being phased out. How long will it be before finding an analog device is more difficult than finding its digital replacement?

While a new millennium is around the corner, a new age of radio will be right alongside offering new challenges to broadcasters and new choices to listeners.

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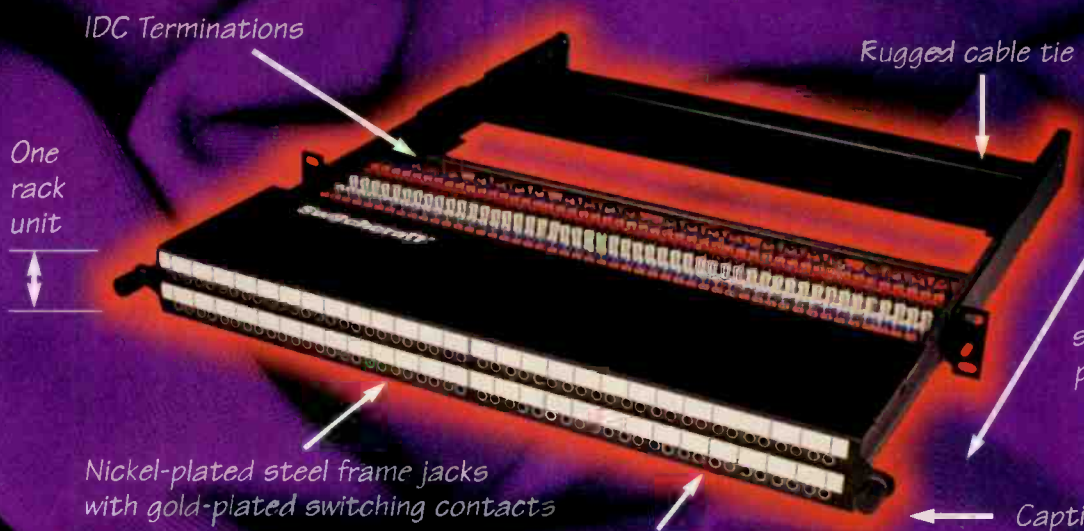

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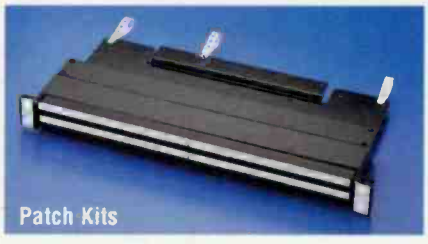

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"I wish I had a..."

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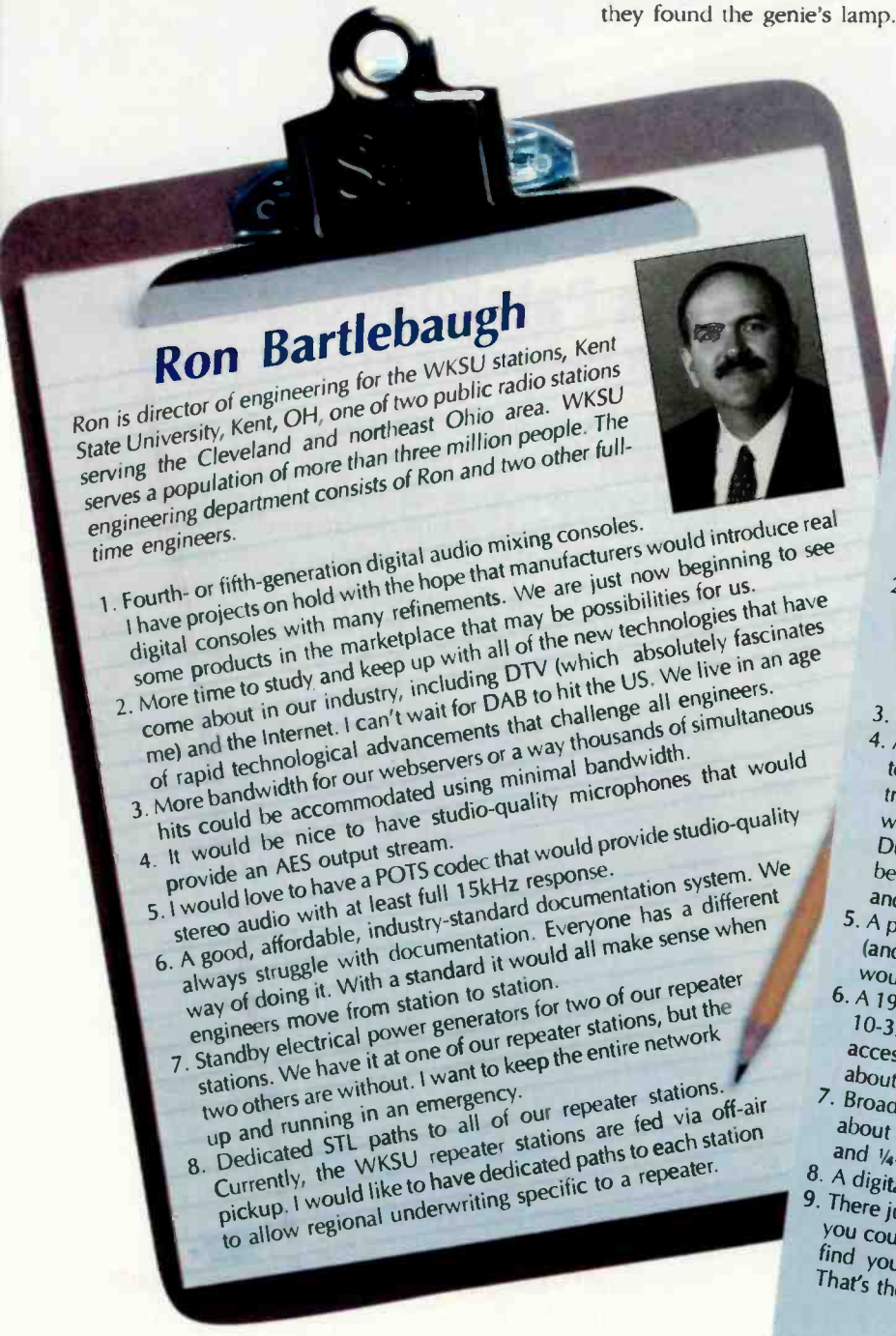
How many times have you asked that question? Most often it comes when you're elbow deep in a project and you realize that there simply has to be a better way of doing it. It also comes up every time radio guys get together with other radio guys. They'll be sitting around talking about the industry and its furtive steps at progress and someone will say "What we really need is..." or "Why doesn't somebody..."

BE Radio asked some of the industry's brightest what they'd wish for if they found the genie's lamp. The answers might surprise you. Mixed in among the political zingers and equipment features bordering on the absurd are the seeds of innovation.

Do you have a wish for the industry? We'd love to hear it. Send them to us via e-mail at *beradio@intertec.com*.



Ron Bartlebaugh

Ron is director of engineering for the WKSU stations, Kent State University, Kent, OH, one of two public radio stations serving the Cleveland and northeast Ohio area. WKSU serves a population of more than three million people. The engineering department consists of Ron and two other full-time engineers.

1. Fourth- or fifth-generation digital audio mixing consoles. I have projects on hold with the hope that manufacturers would introduce real digital consoles with many refinements. We are just now beginning to see some products in the marketplace that may be possibilities for us.
2. More time to study and keep up with all of the new technologies that have come about in our industry, including DTV (which absolutely fascinates me) and the Internet. I can't wait for DAB to hit the US. We live in an age of rapid technological advancements that challenge all engineers.
3. More bandwidth for our webservers or a way thousands of simultaneous hits could be accommodated using minimal bandwidth.
4. It would be nice to have studio-quality microphones that would provide an AES output stream.
5. I would love to have a POTS codec that would provide studio-quality stereo audio with at least full 15kHz response.
6. A good, affordable, industry-standard documentation system. We always struggle with documentation. Everyone has a different way of doing it. With a standard it would all make sense when engineers move from station to station.
7. Standby electrical power generators for two of our repeater stations. We have it at one of our repeater stations, but the two others are without. I want to keep the entire network up and running in an emergency.
8. Dedicated STL paths to all of our repeater stations. Currently, the WKSU repeater stations are fed via off-air pickup. I would like to have dedicated paths to each station to allow regional underwriting specific to a repeater.

Kirk Harnack

Kirk is director of engineering for Delta Radio, president of Harnack Engineering and a frequent contributor to BE Radio, including "Maintaining the Multi-Transmitter Site," October 1998.

1. Network-ready broadcast equipment. My mic processors don't necessarily need IP addresses, but imagine controlling satellite receivers, RPU systems and routing switchers from your desk or home.
2. I'd like a packet-network-enabled audio codec/server/client appliance to send real-time, albeit slightly delayed, high-quality audio across a packet-based LAN or WAN. I say "appliance" because I'd rather do this without using a PC at either end.
3. A jack-proof type-N connector for RPU equipment.
4. A virtual audio console built around a huge, flat-panel touchscreen, customized by each operator. Song titles, traffic reports, contest winners with Caller ID, and the weather forecast could all pop up on-screen as needed. During automated periods, the virtual console would become a DAW and production console with EQ, effects, and a "cart-label" interface to the automation system.
5. A portable version of Item 4 with Iridium phone interface (and a static IP address). Tickets to the Cayman Islands would be a recommended option.
6. A 19-inch equipment rack accessory that holds a supply of 10-32 screws and washers. While you're at it, another accessory that holds Big Gulp or Route 44 drinks and how about a folding tray-table accessory?
7. Broadcast versions of pro and semi-pro equipment. How about a portable mini-disk recorder with XLR connectors and ¼-inch headphone jacks?
8. A digital composite interface for FM exciters.
9. There just aren't enough standards. Just when you thought you could get all your equipment to work cohesively, you find you need another standard to get things working. That's the beauty of standards.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Kevin McNamara

Kevin is president of Exegesis Technologies, a networking and technology consulting firm, and a frequent contributor to BE Radio, including "Consolidation of Production," September 1998.

1. A common open command language to tightly integrate control and diagnosis of any applicable device (transmitter control to a simple audio processor) with a single front-end program on a PC. Telecom has had this for years, and the computer industry has the simple network management protocol (SNMP).
2. To make #1 work, all devices should provide at least an RS-485 compliant port that can be daisy-chained on a serial bus. Even better, add an Ethernet port with SNMP capability.
3. Ethernet ports on digital consoles, processors and storage systems. Audio could be routed through the Ethernet backbone to any destination. You'd also be eliminating a few stages of audio conversion along the way, not to mention cabling.
4. Traffic reports after 6 p.m. There are still people commuting. You already have the traffic people doing your news, how many more barter spots can this possibly cost?
5. Radio station Web sites that provide a significant value to the station. You need a compelling reason for a surfer to use your site. "Click here for a special message from the morning team," DJs in wacky poses, and streaming audio are mildly amusing, but you're missing the big picture. Check the Web site of any major newspaper to see where you need to be.
6. On-air variety. Formats have become so homogenized you can hear the same 30 songs in any city you visit. I understand the need for music research, but just because a song tests well doesn't mean I need to hear it constantly. It is amusing that WSKQ-FM, the Spanish contemporary outlet in New York City, has dethroned longtime leader WLTW-FM as America's most listened-to station based on average quarter hours. I've found myself listening to Hispanic radio in several of the markets I travel as an alternative to the mainstream regurgitated formats — and I don't understand a word of Spanish.
7. A moratorium on any further elimination of broadcast regulations until we fairly evaluate the impact on the industry to date. What's next, permitting a station to move its transmitter site because the coverage at the present site is causing grievous financial impact to the parent company?
8. We're finally seeing owners make a distinction between engineering and MIS. I hope this trend continues.

John Caracciolo

John began his radio-engineering career in 1983 as an engineer for WNYT. He is now settling into his second year as vice president and general manager of Jarad Broadcasting Company, which owns and operates three FM stations on Long Island: WLIR, WDRE and WXXP, Party 105. All three stations operate from Jarad's Garden City, NY, headquarters.

1. A remote and studio encoder and decoder that is capable of transmitting 15kHz stereo audio from a standard POTS line every time, on every hook-up with minimum delay.
2. An accurate radio rating service that worked off a subcarrier or subaudible signal encoded onto the main radio channel. The listener would wear a watch-type device that would decode and store the information received from the station. The watch storage information would be downloaded once a week and an exact survey would be released.
3. ISDN as a standard US phone service.
4. Reliable, very user-friendly professional CD players durable enough to require little or no maintenance.
5. A studio phone hybrid system capable of interfacing with any digital phone system.
6. An audio processor that works digitally yet maintains that robust analog sound. Achieve maximum loudness, but keep the audio as clean and dynamic as a CD.
7. A DAW that is PC-based, easy-to-use and learn, and can be networked to other units in the studio and out. It should have large storage capacity and have a built-in DAT backup. It should have all effects built-in, be low-cost and easy to maintain. File transfer should be simple point-and-click whether the recipient is down the hall or 2500 miles away.
8. A plug-in circuit board that will fix all of our Y2K problems. Plug it into your PC and welcome to the new millenium.
9. A reliable, rugged and portable digital recorder for use by a field reporter, yet small and compact. It should use a common medium like DAT, be low-cost and user-friendly.
10. A DVM-sized test set with a DVM, frequency counter, tone generator, RF probe, small scope, dB meter, and digital test options.
11. A radio engineering training school offering basic electronics and troubleshooting skills focused on radio and radio engineering. A training ground for broadcast engineers.

Andy Laird

Andy joined Journal Broadcast Group in late June as director of engineering for its Radio Group and has been in the radio broadcast industry in various positions since 1967. He is a volunteer participant on the NRSC DAB subcommittee and chairs the Test Guidelines Working Group.

1. A successful IBOC DAB system for both FM and AM. Three proponents are investing huge sums of money in new systems that promise to solve the issues revealed in the EIA/NAB laboratory tests several years ago.
2. Greater use of diversity antenna systems for FM receivers in cars to improve moving vehicle reception problems. Also improved intermodulation performance of AM car radios.
3. Where are the RBDS receivers? I want a receiver that can automatically follow the main station across its translators.
4. An agreed-upon standard for digital compression. Passing files without D/A/D conversions and stacking compression systems greatly improves the final sound quality.
5. As discussed at the last NRSC meeting, an NAB file format standard for hard-disk storage systems (like the NAB cart standard), which would allow for passing files from one system to another.
6. Better tools for the measurement of subjective quality losses that are perceptible to the human ear.
7. A high-speed (optical?) topology system between studios and the central equipment area of station clusters to greatly reduce construction costs.
8. Just say no to monster wire walls!
9. Quiet power supplies for the computers that move into "quiet" studio areas that cost more than $100/square foot.
10. A device that can blow up the signal-blocking hill that inevitably causes a signal shadow where the GM and/or PD live.

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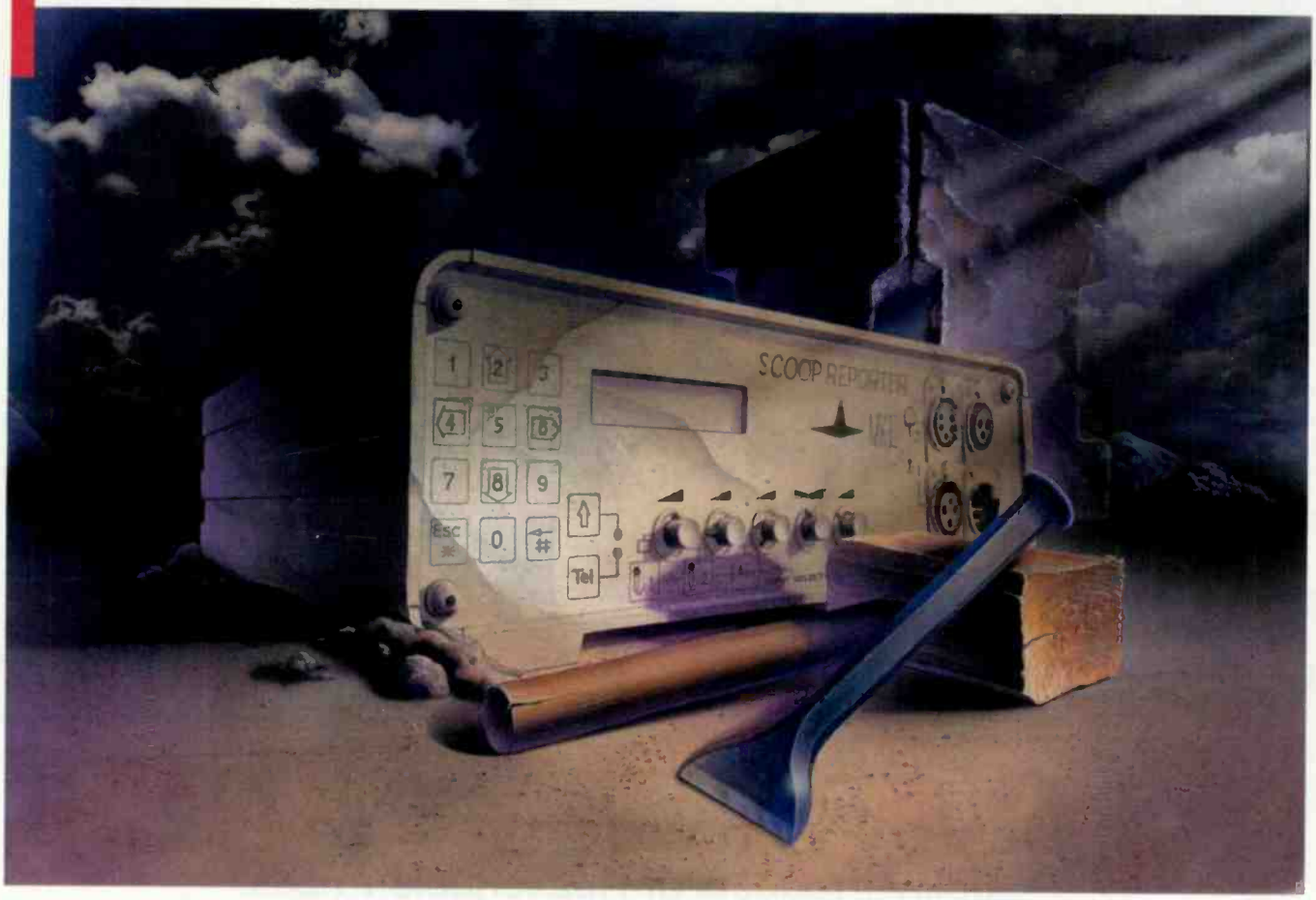
Milford (Smitty) Smith

Smitty has been in the field of broadcast engineering for somewhere on the far side of 30 years. He started at a small 1000W station in Vermont, and his day-to-day involvement on an engineering level continues. He is currently vice president of engineering for Greater Media, East Brunswick, NJ. He has acquired memberships in numerous organizations and currently chairs the NRSC DAB subcommittee.

1. The successful development and initiation of a radically improved digital (DAB) broadcast system in the US The path pursued by the current proponents is a difficult one, but the only one that works technically and politically for the US. All are to be complimented on their efforts in this unbelievably challenging endeavor.
2. A renewed interest and continued rollout of RBDS by broadcasters and the receiver manufacturers. Is there a PD or GM who wouldn't want his/her call letters staring back at every in-car listener?
3. A commonality of audio file formats and header information among DAW and hard disk-based program automation manufacturers. In the New World of consolidation, seamless file transfer among these systems is an absolute necessity.
4. Greater participation, especially by corporate engineers and their respective companies in NAB and NRSC committee work, which is absolutely vital to the industry's future. We now see the same faces so often that we all know each other's middle names. Ditto on greater participation in FCC rulemakings and NOIs.
5. Compensation for technical people that is more reflective of the many talents they now, more than ever, must possess. RF, AF, digital audio, and now computers and networking are required. I chuckle at today's typical help-wanted ads — they aren't asking for much, are they?
6. A corollary: An industry effort to train, recruit and promote new talent. When all of us old guys disappear, who's going to be minding the engine room?
7. A fitting successor to Robert (Bob) Greenberg at the FCC. Bob was the consummate industry liaison and a true friend to the technical side of an industry he took the time to understand. Bob was our collective friend at the FCC; he is sorely missed.
8. Group and station managers who understand that the money spent to send their technical folks to the various industry conventions, especially the NAB spring show, will come back with an amazing interest in terms of new knowledge and contacts in this rapidly evolving industry.
9. On a more nuts-and-bolts note, a high-power, solid-state FM transmitter that is price comparable with today's 20kW+ tube models.
10. I admit we're getting closer, but I'm still looking for the BMX-III of digital consoles.

Rock solid remote connections
A.E.T.A. Scoop Reporter MKII



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Barry Thomas

Barry is technical director for Chancellor Media's KCMG, Mega 100, a new station in the market providing a new oldies-music format to the Los Angeles area. Chancellor holds five stations in Los Angeles. Mega 100 has two full-time engineers while a new facility is being constructed, and the three other market chiefs complete a strong technical team.

1. DAB equipment and standards ready to be adopted and executed. Perhaps a radio Grand Alliance.
2. A working nationwide EAS system.
3. A solution to broadcast telephony that reflects the current state of the industry without using or emulating analog switch systems.
4. An easy-to-use, longer-than-10-mile-distance wireless remote broadcast system that can help resolve standard RPU channel congestion and offer ISDN quality with the independence of RPU.
5. Low-cost, modular digital audio mixing and routing systems that can offer an incremental approach to switching to digital audio transmission.
6. A multitrack or two-channel digital audio editing system with the acceptance, flexibility and power of Mac-based systems on a PC platform.
7. An Internet-based, non-proprietary-equipment audio delivery system to reduce the CPU count in modern radio production studios.
8. PCS that works at least on par with cellular.

Jeff Johnson

Jeff is the network engineer for WVXU-FM, Xavier University, Cincinnati, and also for the X-Star Radio Network. WVXU/X-Star Radio Network comprises the nation's largest privately held radio network. It consists of eight full-power stations in Ohio, Indiana and Michigan. WVXU is also an NPR/PRI affiliate. Jeff has a background in industrial design and electronics dating back to octal vacuum tubes and the birth of the LP.

1. Piggyback wall warts. Why not gangable wall warts like Christmas-tree lights? Better yet, how about an end to wall warts altogether?
2. An IBOC DAB standard sometime soon — anything workable. Look at FM stereo, NTSC and VHS. They are relatively poor standards, but standards nonetheless. Let's hurry before direct satellite and the Internet show everyone how it's done.
3. Overnight loading of audio to a flash RAM cart from digital radio, the Internet, or satellite to play in your Walkman or car the next day.
4. A realization by our industry that we are content providers and not merely transmitter jockeys or cash mills.
5. An end to the digital compression goulash. It is of little wonder that we're nostalgic for fire bottles and dinosaur vinyl.
6. Consistently better equipment documentation. The sales brochure says more than the docs, and they also do it in color.
7. Big knobs and big labels on equipment. Much better control panel design. Why squint at teensy little lettering next to tiny controls?
8. A reasonably sized, portable MiniDisc recorder with big buttons — and make it water-resistant. It'll sell a million.

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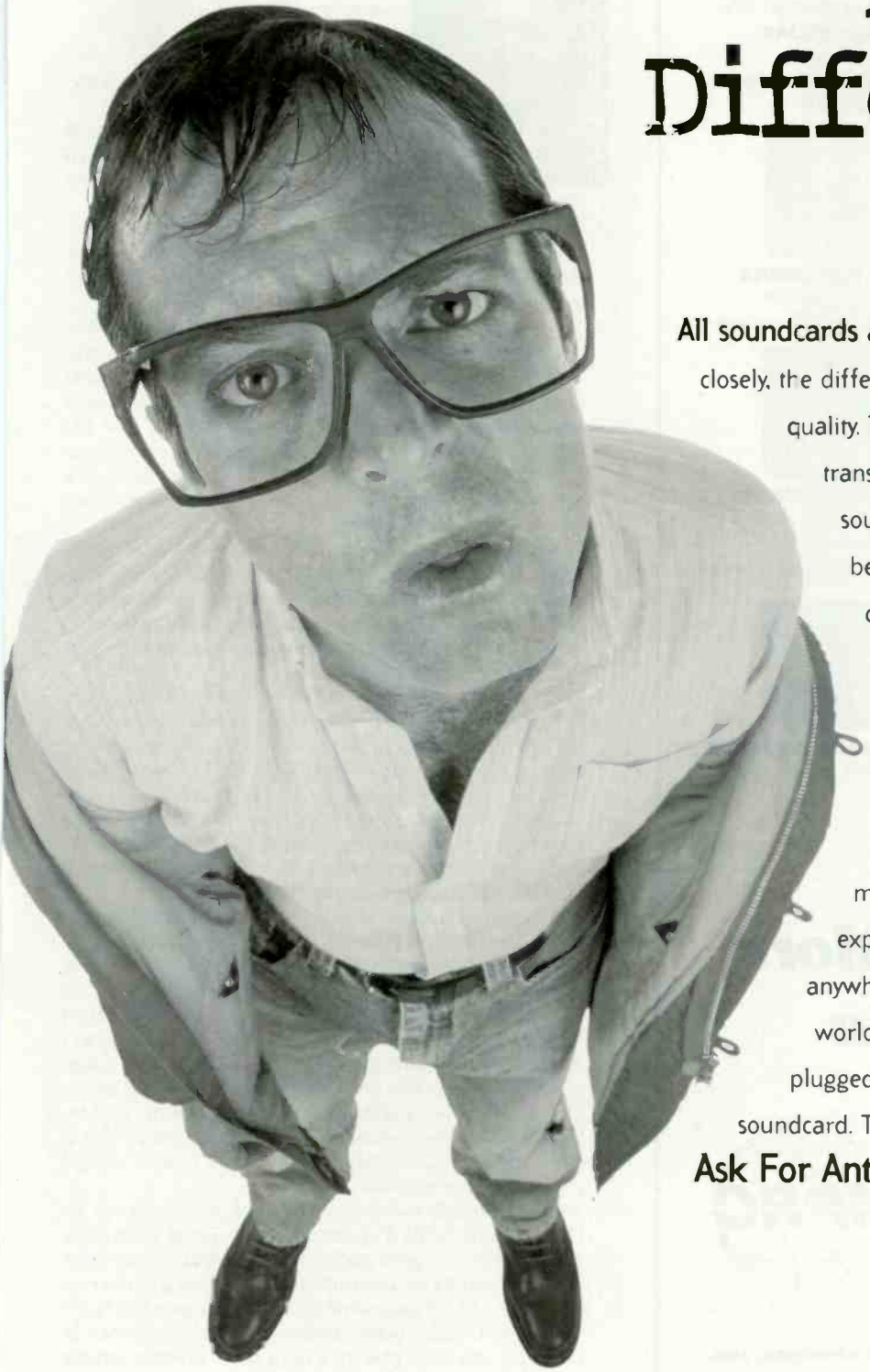

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Harry Martin

Harry is an attorney with Fletcher, Heald and Hildreth and writes the FCC Update column for BE Radio *and its sister publication* Broadcast Engineering.

1. Resolution of the FCC's technical streamlining proceeding. Most changes to AMs will become minor changes exempt from the auctions freeze.
2. The end of the freeze for FM translator applications. There is no reason to keep broadcasters from filing just because the auction rules are not final. If MX situations develop, those contested applications can be held up.
3. Since the FCC will be using auctions when there is more than one application for a newly allocated FM facility, give a bidding credit to the party who finds the channel and allocates it. Otherwise, there is little incentive to propose a new allocation. Relatedly, if someone finds a new FM frequency, that party should be afforded exclusive rights to the channel if a demonstration is made that there is a second, equivalent channel available to accommodate other expressions of interest.
4. A decision from the FCC as to whether joint sales agreements are considered "attributable" ownership interests. Radio stations in such arrangements do not know how JSAs will be treated in the context of the multiple ownership rules, in spite of significant investment encouraged by past FCC silence on this issue.
5. An FCC decision on how to define "market" for purposes of multiple-ownership rule analysis. Currently, markets are defined as the areas included within the city-grade contours of all commonly owned stations. This very liberal standard, now under fire by Commissioners Ness and Tristani, has permitted mega-duopolies in many markets. If the FCC wants to make the definition stricter, to limit the number of stations a party can own in a market, it should do so quickly to eliminate uncertainty.
6. Cancellation, nationwide, of the G. Gordon Liddy program. The same for Howard Stern. (My age is showing.)
7. Cancellation of the FCC's move to the Portals, a building which is inaccessible to engineers and lawyers practicing before the FCC, and which is being rented by Uncle Sam at exorbitant rates. (No one at the FCC wants the move either.)
8. Speedier deployment of in-band, on-channel (IBOC) digital radio. Digital radio will help struggling AMs and generally improve the quality of aural transmissions. Out-of-band digital is impossible without displacing the entire US radio industry. (Or, maybe everyone can have a second channel during transition?)
9. Back on multiple ownership: We need clear standards for FCC referrals to the Department of Justice of potentially anticompetitive combinations. The FCC should make referrals based on these standards and then defer to Justice to make the call. Questionable deals now receive the FCC's version of Chinese water torture, with no consistency in treatment and little hope for a decision — unless a senator writes a letter to Chairman Kennard.
10. My most sincere wish is that the economy remains healthy. It's more fun dealing with broadcasters on a buying spree than receivers and bankruptcy trustees. (Actually, some of the deals I've seen during the past two years might not make it even if GDP doubles next year.)

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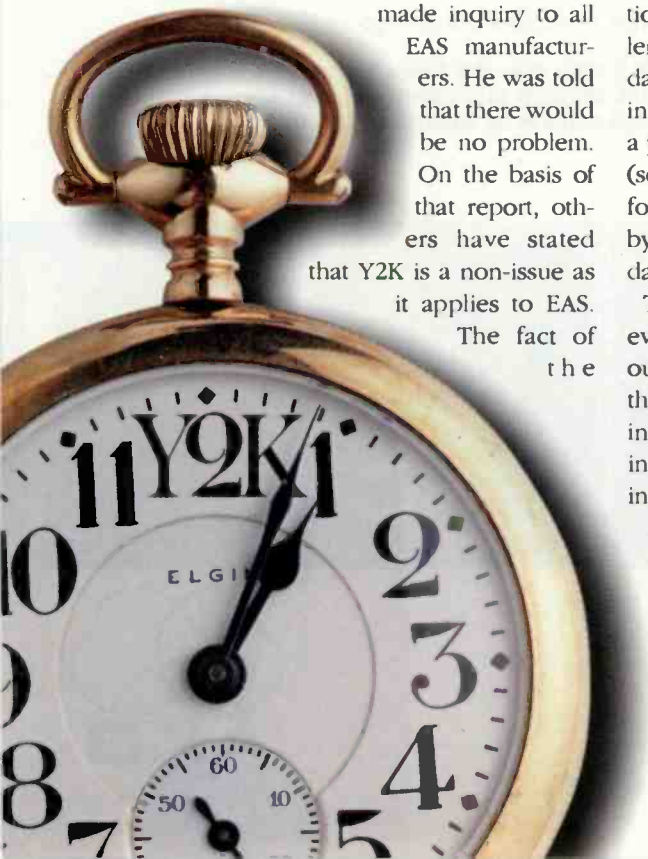
EAS & Y2K: SOL?

By William D. Fawcett

Is time running out for EAS? Technology is changing radio for the future. The next millenium could spell trouble for EAS.

Let's face it, Y2K is getting a lot of press. A recent House panel predicted that more than one-third of the most important systems won't be fixed in time. One system that broadcasters need to be concerned about is the Emergency Alert System (EAS).

In investigating this problem an amazing amount of circular reasoning has surfaced. Several months ago the FCC's EAS head, Frank Lucia, made inquiry to all EAS manufacturers. He was told that there would be no problem. On the basis of that report, others have stated that Y2K is a non-issue as it applies to EAS. The fact of the matter is that there are known problems with the majority of units and that appropriate upgrades have not yet been issued.



Julian date

On the surface, the EAS system would appear to be immune to year-related issues. After all, the datastream protocol uses a date/time format "JJJHHMM", where JJJ represents the day of the year. No year information is actually transmitted. The problem arises in the translation of the JJJ date into a date that includes the year in the unit's user interface (typically a printout). The three digit date code (sequential day number of the year), for dates after February 28, will differ by one when comparing a leap year date to a normal year.

The user interface issues become even more complex when the printout includes a day-of-the-week. In that case, the day returned will be incorrect if the unit processes a date in a year "00" or later as if it occurred in the early 1900's.

According to Lucia, a date scheme which would have used the format DDMMYYYY was considered, but the more concise JJJ format was chosen, not to shorten the datastream but instead to stay with the existing Weather Service SAME protocol.

Y2K compliance defined

Some vendors might define Y2K compliance as meeting FCC specifications. It is important to note that all five units met FCC specifications at the time they were released, and it can be said, to this date, that they *still* meet those specifications. It is possible that a unit may continue to receive and automatically relay messages and yet return incorrect information through the user interface. This is a critical logging situation for fully automated stations.

The selling points of the various EAS units were the additional features not required by the FCC. Those features, or the lack of them, were likely crucial in your purchasing decisions. Therefore, all features of a unit must be reviewed in order to make an enlightened assessment. Full Y2K compliance means that the unit is completely unaffected by the Y2K problem, not that the unit essentially functions in most respects.

Notes on testing

Some broadcasters have set their units to December 31, 1999, and have observed the clock successfully roll over into the new millennium. That is *not* a valid Y2K test. Besides the leap year problem, and a few other known glitches, there are more crucial functions that must be tested.

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Model	Bays	Power	Gain	Price
MP-1	1	600W	-3.3	$250
MP-2	2	800W	0	$680
MP-3	3	800W	1.4	$980
MP-4	4	800W	3.3	$1,280
MP-2-4	4	2,000W	3.3	$1,820
MP-3-5	5	3,000W	4.1	$2,270
MP-3-6	6	3,000W	5.2	$2,740

LOW POWER CIRCULAR SERIES

Model	Bays	Power	Gain	Price
GP-1	1	2,000W	-3.1	$350
GP-2	2	4,000W	0	$1,350
GP-3	3	6,000W	1.5	$1,900
GP-4	4	6,000W	3.4	$2,600
GP-5	5	6,000W	4.3	$3,150
GP-6	6	6,000W	5.5	$3,700

MEDIUM POWER CIRCULAR SERIES

Model	Bays	Power	Gain	Price
SGP-1	1	4,000W	-3.3	$690
SGP-2	2	8,000W	0	$2,690
SGP-3	3	10,000W	1.4	$3,595
SGP-4	4	10,000W	3.3	$4,500
SGP-5	5	10,000W	4.1	$5,300
SGP-6	6	10,000W	5.2	$6,100

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EAS & Y2K: SOL?

You must make sure to observe how *all* functions operate, such as how the unit reports dates for logged events. A legitimate excersize would involve closed-circuit tests between at least two units, and the best test would be to send and receive transmssions between all five approved units. Unfortunately the FCC's Laurel, MD, lab no longer has current versions of all five units on hand.

An attempt has been made to gather information on the current EAS units and also to undertake some informal testing. There may indeed be additional problems not uncovered by this survey.

The leap-year bug

A curious leap-year problem not directly related to Y2K has also been discovered. When interrogating the unit for logged events, the unit will printout the day the event was received (or transmitted) correctly, but will return the day stated in the duration of the event according to the present year, which is not necessarily the year the event actually occurred in. This is hard to explain but important to understand.

Remember that each data string for an event includes a Julian date and time code in the format JJJHHMM. Day 251 (JJJ=251) is September 8 in a normal year, but becomes September 7 in a leap year.

So, if the present year is a leap year, and you printout a logged event that occurred in the previous (normal) year, the date listed in the duration will be incorrect (if the event occurred between March 1 and December 31). The same thing should occur with leap year events printed out in a normal year.

Operationally, this is a minor problem, and again is only vaguely related to Y2K. The same problem would have also occurred in 1996 (a leap year) if the EAS had been operational at the time. It is only coincidence that the year 2000 is also a leap year.

Burk Technology

Burk tells us forthrightly that the Burk EAS unit is *not* Y2K compliant, but that a software upgrade that will address this is almost complete and is slated for release in the near future. The promised but not yet evident first revision has been in the "almost ready" stage for at least a year.

The current Burk unit demonstrates both a Y2K problem *and* a leap-year problem. When the unit is set to the year "00," the printout returns the date "2000" but calculates the day of the week as if it were "1900". For years "01" and beyond, the printout and day-of-week calculations both process the dates in the 1900's. Figure 1 shows an event logged in 1998 and interrogated in 2000. The tapes demonstrate the leap-year problem, and the Y2K problems, to wit, it returns the wrong year (2000 should be 1998) and interprets the day of the week according to the year 1900.

It is conceivable that the Burk unit

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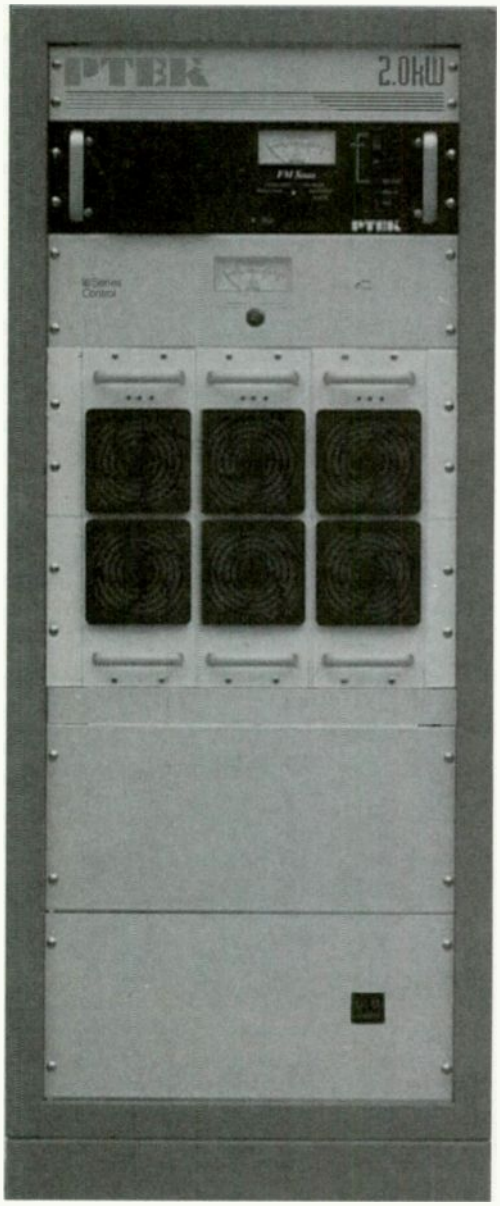

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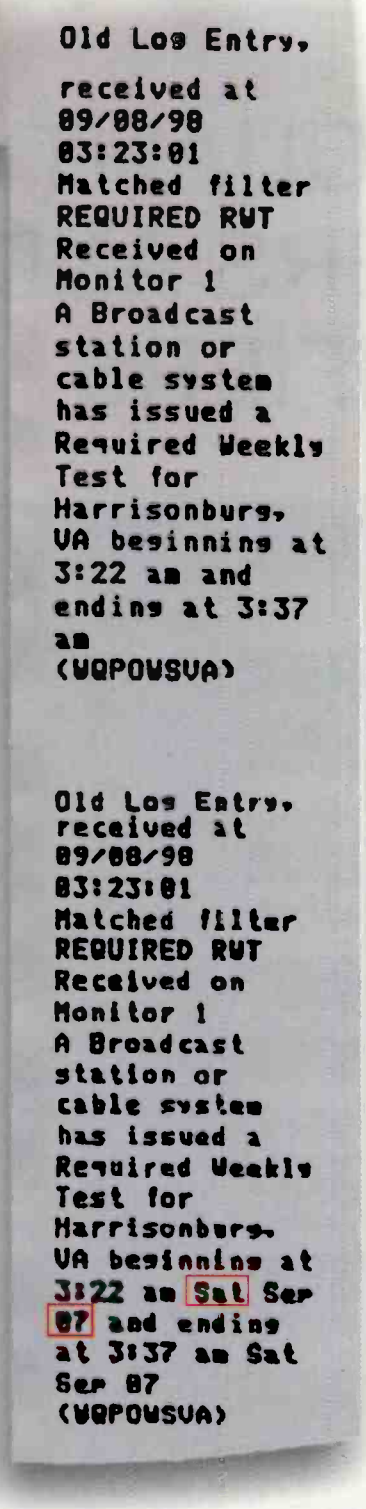

Figure 1. A Burk printout showing the problem with printing out non-leap year logs during a leap year (lower portion). The upper portion is correct as printed in 1998.

would continue to relay messages in 2000 and beyond, but having the wrong day of the week on the printout would cause undue confusion. The Burk unit gives a lot more information on the printout than is required, and this has become its undoing. We have been told that the upgrade will actually supply even more information on the printout.

EAS & Y2K: SOL?

HollyAnne Corporation

HollyAnne states: "*HollyAnne Corporation EAS equipment is year 2000 compliant. This includes equipment built or distributed by HollyAnne Corporation.*

The method of testing followed the guidelines of Y2K compliance analysis including 'leap-and-non-leap-year' functionality. The day tracking analysis was also completed successfully. Additionally the '9999' (September 9, 1999) data failure analysis was completed successfully."

Although HollyAnne's statement lists several pieces of equipment, but excludes the HU-961 unit, a HollyAnne spokesman indicated that the HU-961 unit is compliant.

Multi Technical Services (MTS)

MTS has stated that all the functions of the EAS 3000 are Y2K compliant, including the 486 motherboard and Bios that are the platform for the unit.

As "historical events" are stored as a text file, no leap-year interpretation problems would be anticipated.

Gorman-Redlich

The company states that all units with firmware newer than 6.4 are Y2K compliant (which means the early units were not). There have been several upgrades recently (current firmware is 8.1), and Gorman-Redlich users should ensure that their units are current.

Sage Alerting Systems, Inc.

Sage Endec units are distributed and serviced by Harris Corporation. Harris has issued a statement which says:

"*The SAGE Endec MAX 1822 will continue to receive and transmit properly encoded EAS alerts through the year 2000 with the current firmware version 5.88 as pursuant to FCC parts 11 rules.*

EAS alerts as specified in FCC Part 11.31 (3) (c) do not include the year. The protocol requires that all EAS alerts be encoded with only the Julian day, hour and minute.

The Sage Endec displays the year information for user convenience. When viewing the "menu.alerts.view" alert log function, an anomaly will occur for the display of years 2000 [will be 100], 2001 [will be 101], 2002 [will be 102], etc. for firmware versions lower than 5.103, including 5.88."

What this statement does not tell you is that the Sage unit will demonstrate the same leap-year problem as noted with the Burk unit.

When interrogating the unit for logged events (VIEW ALERTS LOG), the unit will process the day stated in the duration of the event according to the present year, which is not necessarily the year the event occurred in.

So, if the present year is a leap year, and you printout a logged event that occurred in the previous (normal) year, the date listed in the duration will be incorrect (if the event occurred between March 1 and December 31). This is shown in Figure 3, which shows a 1998 Sage printout above the same event printed in the year 2000. Note that the Sage unit has

re-interpreted Julian day 251 as Thursday, September 7 instead of Tuesday, September 8. A similar problem might occur with leap year events printed out in a normal year.

As was stated in the review of the Burk unit, this is a minor problem, and again is only vaguely related to Y2K. The same problem would have occurred in 1996 (a leap year) if the EAS had been operational at the time. So while this is not technically a "Y2K" problem, it is a serious engineering flaw.

Harris has indicated that firmware version 5.103 is available to correct the Y2K problem. It remains to be seen if the upgrade will repair the officially unacknowledged leap-year bug.

According to Harris' vice president for radio, Jim Woods, the $50 charge for the upgrade is defensible because it was a "convenience issue." Sage users will have to determine for themselves if they bought the unit only because it met FCC requirements (as did the other four approved units), or if they bought it on the basis of its proprietary features and user interface. Obviously the latter was the approach encouraged by Harris. One early Sage brochure stated: *"All EAS encoders and decoders are NOT created equal. While they all have to meet minimum FCC requirements, the new Sage ENDEC, alone, provides user-friendly operation."* Harris continues to use this statement in its current website advertising.

TFT Inc.

TFT had previously stated that *"all of its products, [those] that are currently shipping and those shipped previously, will not be affected by any year 2000 issues. Specifically, the EAS 911 series of EAS encoders and decoders and the EMAS series distributed by Federal Signal Corporation will accommodate the rollover to the year 2000 and that for any dates from January 1, 1995 to December 31, 2094."*

Once again the leap-year bug has reared its ugly head. As a result of this investigation, TFT has confirmed that its unit (version V*.820) has *"a problem with annotating the year correctly to received messages."* That's just another way of stating the TFT unit exhibits the same manifestations of the leap-year bug that has afflicted the Sage and Burk units.

TFT has not yet stated what plans they have made to address this problem.

What now?

So what do we do? Broadcasters should continue to pressure the vendors to make repairs at no charge for manufacturing defects. This is a hot issue for many, and there are quite a few broadcasters who still feel that they were coerced into purchasing expensive equipment that was never fully defined by the FCC to start with.

Right now, large cable operators are having to gear up for EAS. Other broadcasters might be replacing equipment as consolida-

tion takes place, and it is possible that some have not yet attained compliance. Steps should be taken to protect your investment in any equipment (including EAS) that has date processing functions. A simple but expedient procedure is to attach a statement similar to that in Figure 2. to any purchase order.

Take heart, the FCC and the SBE (see www.sbe.org/eas/eas_2000.html) are now taking another look at this distressing problem. The ball is now in the court of the manufacturers to make this problem right.

Y2K is not the only problem. Some equipment doesn't compensate for daylight-saving time and will process incoming events as expired until the clock is manually reset, leaving a vulnerable period each April where the system is basically shut down for certain unattended stations. There is also the county subdivision FIPs code problem. The list goes on as there are other problems as well.

Y2K Warranty

The Contractor warrants that all software, firmware and hardware product(s) delivered to purchaser under any agreement, and which is used in accordance with the product documentation provided by the Contractor, shall be four-digit Year 2000 compliant. All products shall accurately process all date-change data from start to finish, including, but not limited to, twentieth, twenty-first centuries and leap year calculations. Any product provided under this Agreement discovered not to be compliant after acceptance shall be corrected by the Contractor at no additional cost to the purchaser. Failure to correct the deficiency shall subject the Contractor to default action.

Figure 2. A sample warranty attachment to accompany purchase orders to certify Y2K compliance.

```
Station Receive Log:
A Broadcast Station or
Cable System has issued
REQUIRED WEEKLY TEST
for the following
counties/areas:
Harrisonburg  VA on
SEPTEMBER 08, 1998 at
10:08 AM effective
until 10:23 AM,
SEPTEMBER 08, 1998.
 Message transmitted on
SEPTEMBER 08, 1998 at
09:22 PM from WMRA/Y/L.


EAS Protocol Text:
ZCZC-EAS-RWT-
051660+00:5-2511408-
WMRA/Y/L-


Printed on TUESDAY
SEPTEMBER 08, 1998 at
09:22 PM.
==========


Station Receive Log:
A Broadcast Station or
Cable System has issued
REQUIRED WEEKLY TEST
for the following
counties/areas:
Harrisonburg  VA on
SEPTEMBER 07, 2000 at
10:08 AM effective
until 10:23 AM,
SEPTEMBER 07, 2000.
 Message transmitted on
SEPTEMBER 08, 2000 at
08:54 PM from WMRA/Y/L.


EAS Protocol Text:
ZCZC-EAS-RWT-
051660+0015-2511408-
WMRA/Y/L-


Printed on MONDAY
SEPTEMBER 08, 2000 at
08:54 PM.
==========
```

Figure 3. The SAGE Endec also has a problem printing non-leap year logs while in a leap year. The lower portion, printed in 2000, has the error.

Windows to the Web

www.neutrikusa.com

NEUTRIK USA, Inc.: The NEUTRIK USA, Inc. website features direct links to various sites including Authorized Distributors, Sales Representatives, NEUTRIK USA, Inc. offices and our parent company's website for on-line access to spec drawings through WHIP files. Viewing includes a What's New section for new product introductions and a Trade Show section so that you can come see our products in person!

www.contelec.com

Continental Electronics: Things to find on the www.contelec.com Web site are: District Sales Manager's contact data; Factory Marketing & Sales personnel contact data; E-Slide - FREE engineering software; Product Line Descriptions and Specifications; Links from Broadcast Supply Division to vendor Web sites.

www.omt.net

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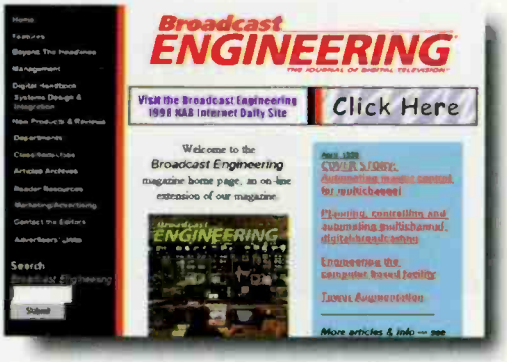

www.broadcastengineering.com

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e-mail neumlit@neumannusa.com
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▶ **OpLOG-2000:** enhanced features include the OpBRIDGE information center, the Pick-n-Play audio library, Heads-n-Tails voice tracking, a promo builder, and a local download store for hard disk audio cut redundancy; package is a client-server digital storage system designed for stations requiring single audio workstations or operations for wide-area networks.

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• **Electronic DNA capability:** new line of sound cards will perform all necessary processes for watermarking, a process by which content providers and producers may track its use over airways and the Internet, has traditionally been done on a computer's native processor, thereby limiting other functions; encoder will be included on new cards and in Digigram's developer kit at no additional cost to developers or end-users.

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▶ **UPL Analyzer Series:** All models can now play back arbitrary sequences of any length by means of the on-board generator with limits set by the RAM of the host computer; the Extended Analysis Function has also been expanded to include third-octave analysis, a function of importance for all acoustic measurements; analyzers are high-speed, low-distortion, analog- and digital-capable audio measurement tools.

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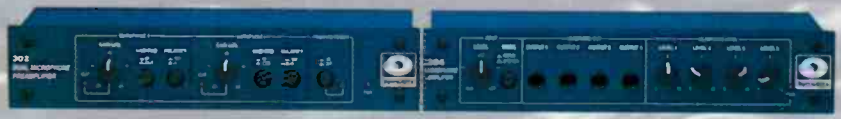
Mic preamp
Symetrix

▼ **302:** two-channel dual mono preamp featuring 20 to 60dB of variable gain; each channel offers a 15dB pad, allowing the 302 to handle



microphone levels up to +14dBV; a polarity reversal switch on both channels corrects the effects of improperly wired cables and mic placement problems; phantom power of +48V is available at both inputs; rear panel connections are XLR jacks for mic inputs and Euroblock terminal strips and ¼" TRS jacks for line outputs. The 302 (left) is pictured here with the 304 headphone amplifier.

425-787-3222; fax 425-787-3211
Circle (206) on Free Info Card

Studio mic
Shure

▶ **KSM32:** a side-address, cardioid condenser mic outfitted with Class A, transformerless preamp circuitry; eliminates crossover distortion and brings improved linearity across its entire operating range; embossed, high-compliance, gold-layered, Mylar diaphragm provides ex-

tended low-frequency response while improving environmental stability; the low mass of this ultra-thin (2.5 micrometer) diaphragm enables it to accurately reproduce the transient response of any sound source.

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Fiberglass AM antenna
Valcom

• **V-33070 Series:** 74-foot, coil-loaded, self-supporting whip antenna is particularly well-suited for use as a low-power or back-up transmitting antenna for AM broadcast; average power rating is 2KW below 1.5MHz and 5KW above 1.5MHz.

519-824-3220; fax 519-824-3411;
e-mail enquiries@valcom-guelph.com
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New Products
FROM AES & NAB RADIO

STL Plus enhancements
Intraplex

▶ **CSU functionality and Windows interface:** enhanced version of the STL features integrated channel-service unit (CSU) functionality, providing loopback testing, long-term statistics and performance-monitoring capabilities that meet AT&T 54016/ANSI T1.403 standards; another benefit is added surge protection compliant with FCC Part 68.

Windows management interface allows the determination of status, checking of alarm systems and the change of configuration settings for Intraplex systems; provides single control interface for various Intraplex systems; more than 50 STL Plus systems can be managed from a single point.

978-486-9000; fax 978-486-0660
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Patchbays
Rean

◀ **LF Series:** units feature 48 or 52 jacks and are available in four colors to provide high aesthetics and instant verification through color coding; jacks are mounted in a durable insulating panel, and the assembly is mounted in a machined-aluminum extrusion delivering complete rigidity; each unit incorporates a strain relief bar on the back of the unit to help preserve solder points.

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ISDN codec
Audio Processing Technology

• **BCF256 Broadcast Communications Frame:** apt-X-based codec designed for the ISDN, direct-dial environment and permanent links such as T1, E1, satellite and microwave; the full-duplex unit facilitates transmission bandwidths from 56 to 256kb/s with corresponding audio bandwidths from 6.8kHz mono to 15kHz stereo; inherent resistance to multiple coding errors and the lowest possible coding delay make the unit ideal for live transmission.

+44 (0) 1232 371110; fax +44 (0) 1232 371137;
e-mail salesusa.aptx.com
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Voice tracking
RCS

▶ **Internet VoiceTracking:** works in conjunction with Master Control NT and a normal browser at dial-up connection speeds and requires only a Windows-compatible sound card and microphone at a remote site; allows stations to voice track any shift on any station from a geographic location with reliable Internet access.

914-428-4600; fax 914-428-5922; e-mail info@rcswerks.com
Circle (212) on Free Info Card

For direct links to these New Product manufacturers, check out www.beradio.com

New Products
FROM AES & NAB RADIO

ADAT media
BASF

▲ **Formatted ADAT Masters:** eliminates need to format ADAT masters before recording, allowing engineers to go directly to tape; available in 40 and 60-minute lengths, and compatible with all ADAT Type 1, 16-bit recorders; a 20-bit Master will be available in the first quarter of 1999.

888-295-5551;
fax 805-295-5554;
e-mail infc@emtec-usa.com
Circle (213) on Free Info Card

STL solution
Harris

• **Aurora 2400:** integrates with the Intraplex STL Plus to provide an unlicensed alternative to congested analog STL frequencies, conventional analog leased lines, or public T1 circuits; allows spread-spectrum radios to be installed quickly without time-consuming and expensive frequency coordination, while providing a full T1 digital signal meeting all standards; by using special coding techniques and spreading the transmission signal to minimize any possible interference, the unit is able to provide reliable links in the 2.4GHz band without requiring a dedicated frequency.

800-622-0022;
fax 765-966-0623;
e-mail broadcast@harris.com
Circle (220) on Free Info Card

New Products
FROM AES & NAB RADIO

DAW
Studio Audio & Video Ltd.

▶ **SADiE 24-96:** capable of 192kHz editing and mixing, full-surround sound panning, and can be configured to provide up to 32 I/Os; each 24-96 card is equipped with eight inputs and eight outputs, and can relay 24 tracks of edited 16-bit audio; 20-bit analog conversion is built into the system and external converters are provided for by AES/EBU digital I/O on every channel; up to four cards can be linked together to provide a total of 32 I/Os; the eight I/O configuration may be purchased as cards, software only, or as a fully configured, rack-mountable, turnkey system.

615-327-1140; fax 615-327-1699; e-mail info@sadieus.com
Circle (215) on Free Info Card

Digital multitrack recorder
Yamaha

◀ **D24:** based on 3.5" magneto-optical disks, the 24-bit, 96kHz unit offers 16, 20, and 24-bit, eight-track simultaneous record and play capability at 44.1 and 48kHz sampling rates, and four-track record/play at 96kHz; additionally, the unit offers modularity, the benefits of nonlinear editing, and the convenience of removeable media; up to eight units can be combined for 64-track simultaneous recording.

714-522-9011
Circle (216) on Free Info Card

Internet audio service
DG Systems

• **iAudio:** transmits broadcast-quality radio spots via the Internet to more than 6000 destinations in as little as one hour; gives large station groups the capability to leverage creative, production, and voice talent, even if individual stations currently have incompatible systems; provides seamless integration into existing equipment and environment.

415-276-6600; fax 415-276-6601
Circle (217) on Free Info Card

Digital console
Klotz Digital

▶ **Spherion:** available in two sizes, a 12-fader version with 24 input sources and a 20-fader console with 40 input sources, the unit has stereo program outputs in digital and analog, stereo audition outputs in digital and analog, a stereo analog record bus, and two analog mix-minus outputs; monitoring outputs include cue, two studios, control room and headphone, each with its own source select; sources include microphone, stereo analog line, and various formats of digital line inputs; sources connected to the console can appear on any fader.

770-729-6811; fax 770-449-9236; e-mail klotz_digital_sales@compuserve.com
Circle (218) on Free Info Card

For direct links to these New Product manufacturers, check out www.beradio.com

New Products
FROM AES & NAB RADIO

Audio transmission system
MUSICAM USA

• **TEAM:** Universal audio transmission system for T1 and E1 leased lines; modular construction and support of linear and multiple audio coding standards make it ideal for STL use and future multiple audio transmission requirements; unit offers up to 12 mono or six stereo programs over one T1 or E1 line, linear, uncompressed, low-delay audio for an STL, and multiple coding standards for uni- and bidirectional transmission, including: MPEG Layer II and Layer III, J4.1 (384kb/s mono), G.722 (basic voice communications), j5.7 linear audio with no compression, and MUSICAM encoding for enhanced compatible MPEG layer II.

732-739-5600; fax 732-739-1818;
fax-on-demand 732-935-2777;
e-mail roadrunner@musicamusa.com
Circle (219) on Free Info Card

Audio generator
Neutrik

▲ **Minirator MR1:** handheld unit produces a low-distortion sine wave (20Hz to 20kHz); offers balanced XLR and unbalanced RCA floating outputs at 200Ω, sinusoidal, square, white and pink noise, and polarity test waveforms, and selectable readouts in dBu, dBV and V; is capable of more than 10 hours of continuous operation, but will auto power off after a user-selected 10, 30, or 60 minutes.

732-901-9488; fax 732-901-9608;
e-mail East: rhanco@aol.com,
West: neutrikusa@aol.com
Circle (211) on Free Info Card

For direct links to these New Product manufacturers, check out
www.beradio.com

STATEMENT OF OWNERSHIP

Statement of Ownership, Management and Circulation (Act of Aug. 12, 1970; Section 3685, Title 39, United States Code).

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10. Owner (If owned by a corporation, the name and address of the corporation must be stated followed by the names and addresses of all stockholders owning or holding 1% or more of total amount of stock. If not owned by a corporation, the name and address of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as those of each individual owner must be given. If the publication is published by a non-profit organization, its name and address must be stated: PRIMEDIA Inc., 745 Fifth Avenue, New York, NY 10151.
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13. Publication title: *BE Radio.*
14. Issue date for circulation data below: September 1998.

Extent and nature of circulation:

	Average No. of copies each issue during preceding 12 months	Actual No. of copies of single issue published nearest to filing date
A. Total No. of copies printed (net press run)	14,973	14,892
B. Paid and/or requested circulation		
1. Sales through dealers and carriers, street vendors and counter sales	0	0
2. Paid or requested mail subscriptions	12,537	12,518
C. Total paid and/or requested circulation	12,537	12,518
D. Free distribution by mail (samples, complimentary and other free)	1,032	1,052
E. Free distribution outside the mail (carrier or other means)	542	500
F. Total free distribution (sum of D and E)	1,574	1,552
G. Total distribution (sum of C and F)	14,111	14,070
H. Copies not distributed		
1. Office use, leftovers, spoiled	862	822
2. Returns from news agents	0	0
I. Total (sum of G, H1 and H2)	14,973	14,892
Percent paid and/or requested circulation (C/Gx100)	88.8%	89.0%

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Dennis Triola,
Publisher

News

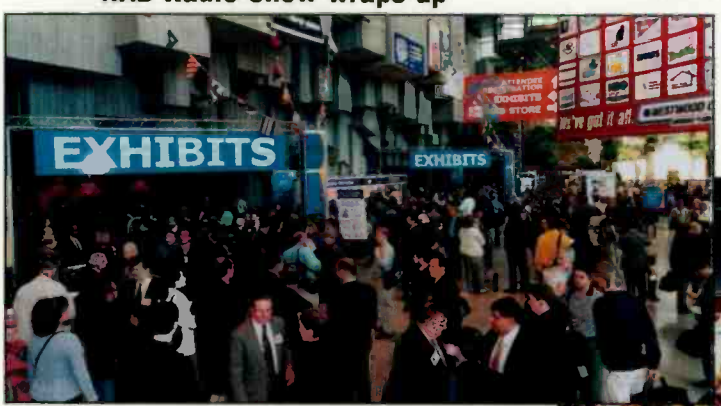
Novell wins terminology case

The Appellate Court of Illinois affirmed an earlier ruling by the Circuit Court of Cook County that Novell's use of the term "engineer" in its certification titles does not violate Illinois professional engineering laws. In July 1997, the circuit court reversed a cease-and-desist order issued by the Illinois Department of Professional Regulation that prohibited any use of "Certified Netware (or Novell) Engineer (CNE)" in the state. The Department claimed that the public was confusing the CNE title with the title of "Professional Engineer."

Lacking any evidence or particular instance of confusion, the Department agreed on appeal that the state's Professional Engineering Act prohibits all uses of the term engineer by anyone not licensed by the state to practice professional engineering, regardless of whether the use is misleading. The Appellate Court disagreed, concluding that such an interpretation of the Act would lead to "unjust and absurd" results such as prosecuting a locomotive engineer for using *engineer* in a resume. Instead, the court held that the Act must be construed as banning only those uses of the title that imply licensure by the State as a professional engineer and that Novell's titles do not imply such licensure.

The Department of Professional Regulation did not respond to requests for comment on plans for appeal or further regulatory efforts.

NAB Radio Show wraps up



A busy time at NAB Radio.

The NAB concluded its 1998 Radio Show on October 17th, and pinned the number of exhibitors at 181, down from the 1997 total of 205, a 12 percent drop. Show organizer's pointed toward space constraints at the Seattle convention center where the show was held as the major reason behind the lower numbers, even citing the existence of a waiting list of potential exhibitors as evidence that interest in the show is definitely not waning. The NAB counted approximately 7000 attendees to this year's show, a number that is consistent with past years.

Next year's Radio Show will be held September 1-4 in Orlando, FL.

FCC, NAB draw fire from pirates during demonstration and forum

A small group of microbroadcasters met recently for a protest march on the FCC and NAB in Washington, DC. About 60 individuals from all walks of microbroadcasting life came together October 5 to take their concerns directly to the medium's regulatory body.

The demonstration, intended to protest the recent shutdown of more than 300 microbroadcasters by the FCC, then made its way to the headquarters of the NAB. Shortly after the procession arrived, participants brought down the NAB flag and raised the Jolly Roger, the traditional pirate flag. Police intervened soon thereafter. Two members of the delegation were detained, but no arrests were made as the Association refused to pursue charges.

Members of the group provided coverage of the entire march to local listeners via 97.5MHz on the FM band by means of a portable transmitter assembled at the march's point of origin. The frequency was unlicensed for use in such a manner, but though they were broadcasting from in front other FCC's headquarters, no equipment was confiscated and no citations were issued.

A forum entitled "Broadcast outlaws: The high-voltage debate over low-watt radio," presented by the Freedom Forum, preceded the demonstration. The program featured panelists representing the various perspectives involved in the debate – government, licensed broadcasters, microbroadcasters, and the public.

Featured speakers included: David Leder, KIND Radio, San Marcus, TX (currently the target of an FCC inquiry); Diane Fleming, Radio Mutiny, Philadelphia (shut down by the FCC last summer); Jerry Svoko, Grid Radio, Cleveland; Jesse Walker, associate editor of Reason magazine and an organizer of the demonstration; Wayne Coy, communication and broadcast lawyer; and Harry Jessell, editor of Broadcasting and Cable magazine.

The FCC and NAB, who were both invited to the forum, declined participation.

Computer-based audio systems

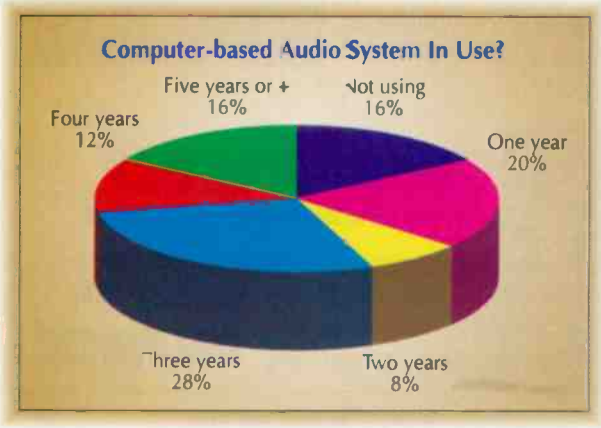
By Chriss Scherer, editor

There are obviously many computers used in radio today. Our survey this month asks not how many are used, but looks into the history at a facility. Computer-based editors and on-air playback/automation systems have grown up on separate paths. They have both firmly established themselves today.

DAWs and editors seem to have entered all markets at about the same time. The data we collected did not reflect that they were accepted in any market range faster than another. However, the story for on-air playback is different. For the most part, smaller markets made the switch before the larger markets. The reasons for this are many. Some respondents mention that smaller markets tend to push equipment life to its limit because budgets are smaller. When 25 year-old cart machines quit, move to the next step: computer-based automation.

Survey question ▶

How long has your facility had some form of computer-based audio delivery (automation) system?



The switch to a digital delivery system has taken place in waves, with an opening splash that peaked about three years ago before settling down for a year, and then a resurgence last year.

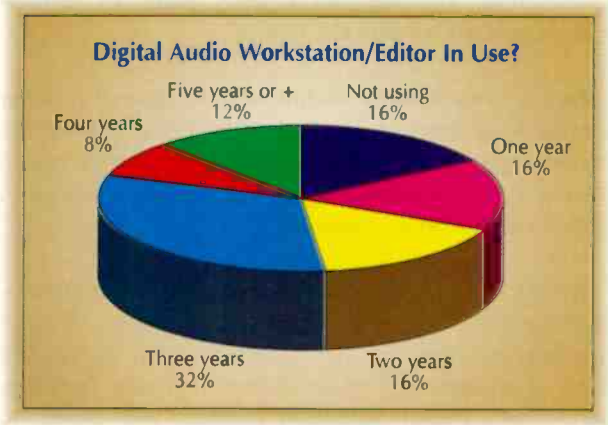
The first digital editors were not very efficient at what they were designed for, often being much slower and costlier than their analog predecessors. This changed in time as faster processors and operating systems were integrated.

While DOS and Windows platforms have dominated the automation systems, DAWs have been built around Macintosh and Windows.

Installation was fairly flat until three years ago. This can probably be tied to the introduction of Windows95 and Macintosh system 7. Hardware cost was beginning to drop as well.

Survey question ▼

How long has your facility had some form of computer-based production (editor, DAW) system?



January's Survey:
The Digital Transition
Participate now: www.beradio.com

Business/People

Business

Leitch, Chesapeake, VA, announced a reorganization to combine operations for its Leitch, ASC and Tekniche divisions worldwide. The brands have previously been sold and distributed through different channels, but the company believes that a consolidated effort will allow it to further focus on growth and dedicate itself to the global market.

360 Systems, Westlake Village, CA, announced the sale of eight Instant Replay 2.0 recorders and 19 Short/cut editors to Emmis Communications for use in its new Indianapolis facility (See *Facility Showcase*, September 1998, p. 52). WIBC, WENS, WNAP, WTLC-AM, WTLC-FM, Network Indiana and the Agri-America Network will employ the units for content production.

USA Digital Radio, Columbia, MD, and **Shively Labs**, Bridgton, ME, signed a cooperative agreement to develop a low-loss combiner that works with the USA Digital Radio IBOC system.

Digital Generation Systems, San Francisco, CA, announced the acquisition of Digital Courier International, Vancouver. The acquisition gives DG Systems approximately 40% of the spot-delivery business in the US and Canada.

American Mobile Radio Corporation, Washington, DC, announced that it has changed its name to **XM Satellite Radio Inc.** The company also announced programming agreements with USA Today, Bloomberg News Radio, Heftel Broadcasting Corporation, Salem Communications Corporation, AsiaOne and C-SPAN Radio to provide audio channels for the XM service.

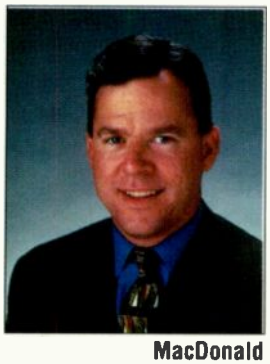
Harris Corporation, Richmond, IN, signed a master purchase agreement with Chancellor Media Corporation, under which Harris will supply radio broadcast equipment and related services to all Chancellor-owned radio stations on a non-exclusive basis.

Orban, San Leandro, CA, and **Prophet Systems**, Ogallala, NE, have joined forces to develop new software intended to allow finished productions to go directly from workstations to on-air delivery systems. Development teams report significant progress and expect to begin beta testing as early as this month, with shipping to begin by the first quarter of 1999.

Dalet, New York, announced the sale and installation of a networked Dalet digital audio system to CNNRadio. The system includes Dalet's Autorec, and Surfer series multitrack editors.

Klotz Digital announced the opening of an American office that will head up operations for the company in North, Central and South America. The new address is 6525 The Corners Parkway, Suite 400, Atlanta, GA 30092. Klotz America can be reached at 770-729-6811, or faxed at 770-449-9236.

Leitch announced the relocation of its Northeast sales office to 111 Galway Place, 1st Floor, Teaneck, NJ 07666. The office can be reached at 201-833-8083 or toll-free at 888-835-6424; fax 201-833-8089.


MacDonald

PEOPLE

Dan Moliterno has been hired as vice president, operations, for Pacific Research & Engineering, San Diego, CA.

▲ **Michael MacDonald** has been promoted to president of JBL Professional, Northridge, CA. **Mark Terry** will remain chief executive officer for JBL, while assuming the presidency of Harman Pro Group, America.

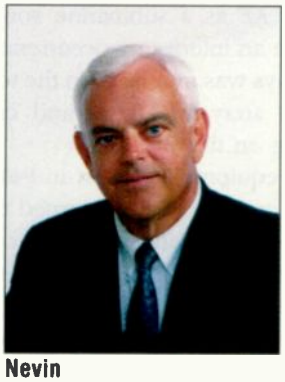

Killianey

▲ **Patrick Killianey** has been appointed to product specialist for TASCAM, Montebello, CA.

Ken Davies has been appointed vice president of engineering for Leitch Technology Corporation.

▶ **Jesse J. Piatte, Jr.** has been named vice president of sales, US markets, for TFT Inc., Santa Clara, CA.


Piatte


Nevin

◀ **John J. "Jack" Nevin**, president and CEO of Broadcast Electronics, Quincy, IL, announced his retirement. Douglas Davis will replace him until an executive search for a new company president can be completed.

Reader Feedback

E-mail: beradio@intertec.com
FAXback: 913/967-1905

Did you hear that?

I found John Battison's AF/RF article (*RF Engineering*, September 1998, AF or RF?) very interesting, given that I spent 14 years dealing with AF as a submarine sonar technician. I thought I'd share an interesting occurrence.

One of our hydrophone arrays was mounted on the top of the "sail" structure. This array was high and dry whenever we were operating on the surface.

One day, while testing the equipment in port in Pearl Harbor, I discovered a signal around 13kHz. I turned up the volume and one of our radiomen came by to find out how I was receiving the VLF submarine broadcast. When I put it on a high-speed spectrum analyzer, sure enough, the marks and spaces of the teletype could be plainly seen.

The hydrophone was so sensitive that it could pick-up such a weak EM signal and amplify it, noise-free, so that I could have piped it to the radio room to be used as a backup receiver.

By the way, we referred to that frequency as HF(A).

Tim Mauch
Chief Engineer
Mauch 5 Communications, KNTB-AM, Lakewood, WA
KBRO-AM, Bremerton, WA

Without a net

I was shown the cover of the October 1998 *BE Radio* by a co-worker. We found it very interesting that the worker was at such a height without any apparent safety equipment to protect himself from falling. Additionally, he must be receiving much more RF radiation that would normally be allowed by ANSI standards — haven't you all ever heard of OSHA or ANSI? You couldn't have been more effective at advertising unsafe work habits practiced by this person, unless you'd placed a call directly to the Secretary of Labor.

Carol Devine
Safety Engineer
Colorado Springs, CO

I have just returned from the Central Canada Broadcast Engineers convention where one of the workshops was on fall arrest and tower safety. I have to wonder when I see a picture of someone hanging off an antenna with no visible fall arrest gear just what message that sends to management. "Have the junior guy relamp the tower, Chief! What do you need fall arrest for?"

In an age when every employer is demanding that we do more for less and with less, I think that picture sends the wrong message very loudly.

On the positive side, your magazine is full of great articles and I enjoy it every month. Keep up the good work, but look carefully at the pictures.

Harrie Jones
Director of Engineering
CFRA/CKKL-FM

That's a great photo on the October cover. I'm one of Tom's biggest fans so I sure hope OSHA or his insurer doesn't come across that shot with no safety belt showing. We'd hate to lose him.

Clyde Miller
KERA/KDTN
Dallas, TX

Tom Silliman, president of ERI-Electronics Research, who is pictured on the October cover, replies:

I would like to thank everyone for their concern for my safety. However, the picture exaggerates my risk. There was no RF exposure from the antenna as the power was off during the inspection. All applicable safety precautions were observed as prescribed by OSHA, ANSI, and the building authority for a brief antenna inspection by a certified climber, which I am.

Tom Silliman
President, ERI-Electronics Research, Inc.
Chandler, IN

We received several letters concerning that cover photo. No one at BE Radio *condones unsafe work practices. We strongly recommend following all safety procedures whether you're in the air or on the ground. The photo was not meant to thumb our nose at ANSI or OSHA. You must admit however, it is a spectacular photo captured by the photographer, Lou Bopp.*

Also, just to clarify an issue of geography, the other tall building you see directly behind Tom is the Chrysler building.

Chriss Scherer, editor

Coming in the January issue of BE Radio®

Cover Story: Engineering Consolidation

Combining staffs and facilities takes solid planning and attention to detail.

Feature Story: Digital Consoles

On-air consoles are getting a make-over. The heart of the control room has been a holdover to analog until now. We also look at the products that are out there.

ALSO:

Part 1 of the antenna series • Remotes
Disaster preparedness • DAB update
New Products and Currents including the online survey results.

We're thinking "in the box."

With all the "out-of-the-box" thinking going on these days, we thought it was time someone put some thought in the box.

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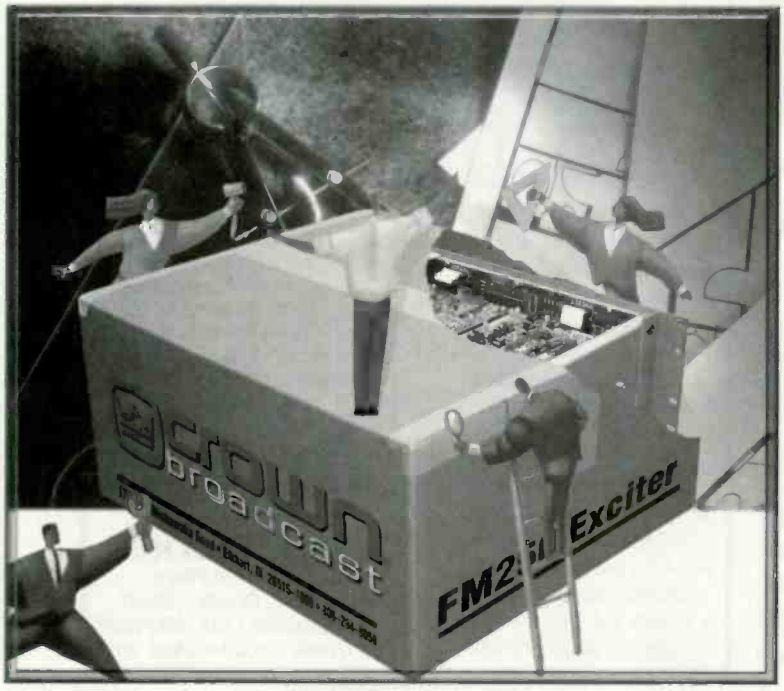
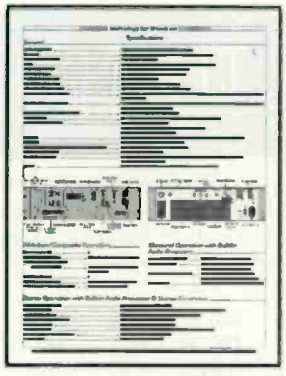


Quality FM Exciters

Performance

You've got to see our latest specifcations. You'll find wide stereo separation, a low signal-to-noise ratio, and a host of other specs we've not previously published.



New, impressive specs! Call for all the details.

Power Levels

Crown exciters are available in 30–watt, 100–watt, 250–watt, and 500–watt versions—each in an attractive, compact, and rugged chassis.

Customer Corner

"Everytime I open up a Crown box, I am amazed at the reliable and elegant design. P.S. The new exciter board looks great!"

—Glenn Finney, Chief Engineer, Macon, Georgia

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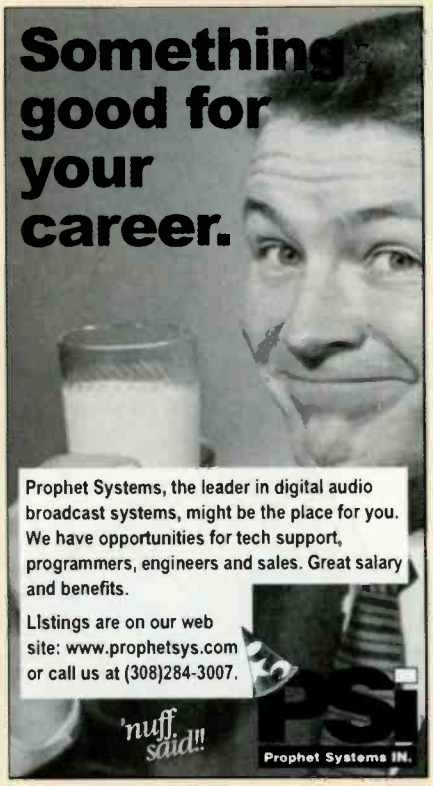

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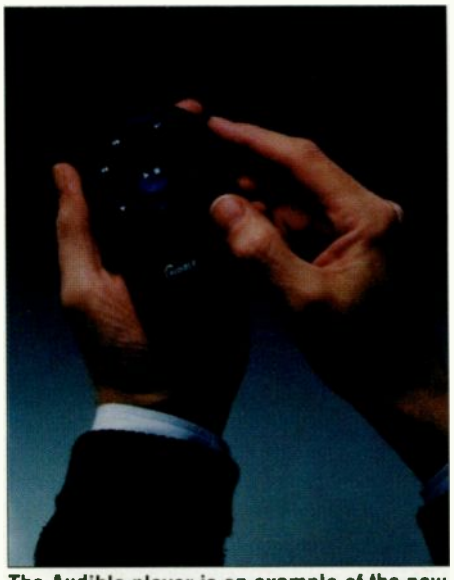
Watching the horizon

By Skip Pizzi, editor-in-chief

As we wind down toward year's end, it's worth looking back at some developments that may herald future directions for the radio industry. Radio broadcasting as we know it will continue to develop incrementally, so changes and updates in that space are the easy part. The more important analysis takes place on the fringes, where truly new paradigms that could replace radio (or substantially erode its audience) are now developing.



The Audible player is an example of the new class of portable audio devices that use the Internet for delivery of content.

Some provide new audio content to consumers, while others involve new delivery technologies. Both are important in different ways: New content affects radio's audience behavior because people can only listen to one thing at a time. Meanwhile, new delivery methods may become useful to radio stations in implementing their *own* alternative services. So this analysis has both "offensive" and "defensive" components.

New content providers

Besides the growing number of on-line radio or audio services designed for standard Internet delivery to desktop computers via POTS, ISDN or corporate intranets, a number of dedicated hardware/software systems that extend the Internet audio model have emerged recently. These include spoken-word systems using proprietary algorithms (e.g., *Audible*, *Audio Highway*), and music-delivery products employing MPEG Audio Layer 3 (MP3) data compression (e.g., *Diamond*, Multimedia's *Rio*).

You could dismiss these as simply another packaged media product type, more competitive with CD sales than with radio, but the convenience, timeliness, cost and portability of these services puts them somewhere *between* radio and packaged media in terms of user behavior.

New service potential

Several unrelated developments in the area of wireless communications point out that this area will be very hot in the next few years. For example, a recent Australian breakthrough originally intended to provide greater sensitivity for radio telescope antennas allows increased bandwidth and robustness for terrestrial data transfer. Analysts expect this to translate into improved mobile and portable Internet access via wireless telephony.

Meanwhile, a group of about 90 telecom and computer hardware companies is developing a new wireless data exchange standard called *Bluetooth*. The standard will provide robust, broadband wireless connectivity at rates of 1 to 2Mb/s. It is intended for application in cellphones, portable computers, cameras and other portable devices.

On the regulatory front, the FCC recently changed a rule that had prevented wireless telcos from offering Internet access to their customers. On the supply side, a bandwidth boom is taking place, with AT&T, WorldCom/MCI, Mindspring, Quest, Level 3, ITXC and Williams Communications all announcing substantial network expansions.

Taken together, these developments argue that wireless Internet appliances and affordable connectivity will come sooner rather than later. This could make the addition of interactivity to the convenience of radio-like receivers a reality within the next two or three years.

Another peripherally related item involves speech processing, which is now moving to the Internet, fueled by its e-commerce potential. Several firms are at work on speech-recognition systems that are speaker-independent and do not require the training and sample-storage of current technology. Meanwhile, a group of companies led by Motorola has developed *Voice Markup Language* (VML), which allows synthesized speech response to be added to web pages. This work could play a major role in the world of mobile computing (see The Last Byte, July 1998), and beyond. Consider the possibilities of voice response to advertisements heard in the car...

Predicting behavior

The consumer will ultimately determine which, if any, of these new technologies becomes a killer application. So analysis and influence of consumer behavior is important to any telecommunication company's strategy.

For the same reason, this column will continue to observe the consumer marketplace and report pertinent trends to the radio industry.

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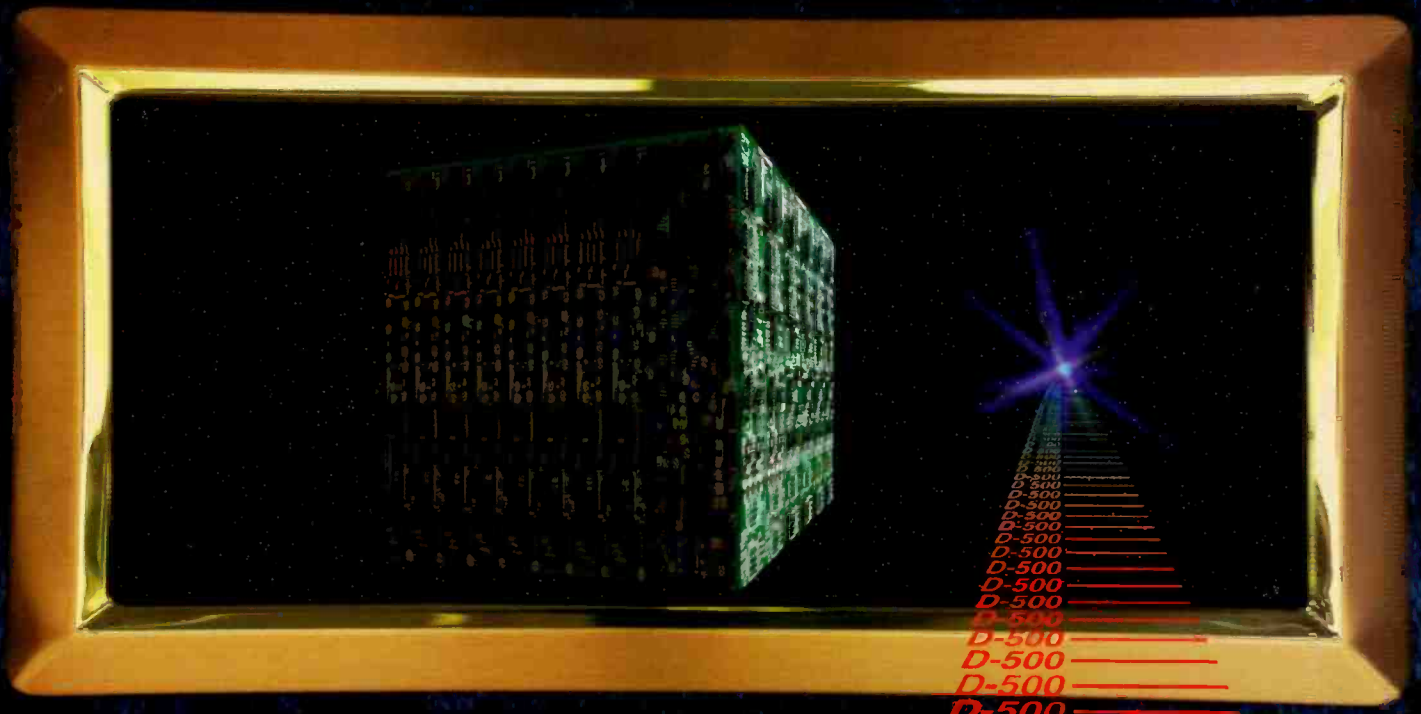

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